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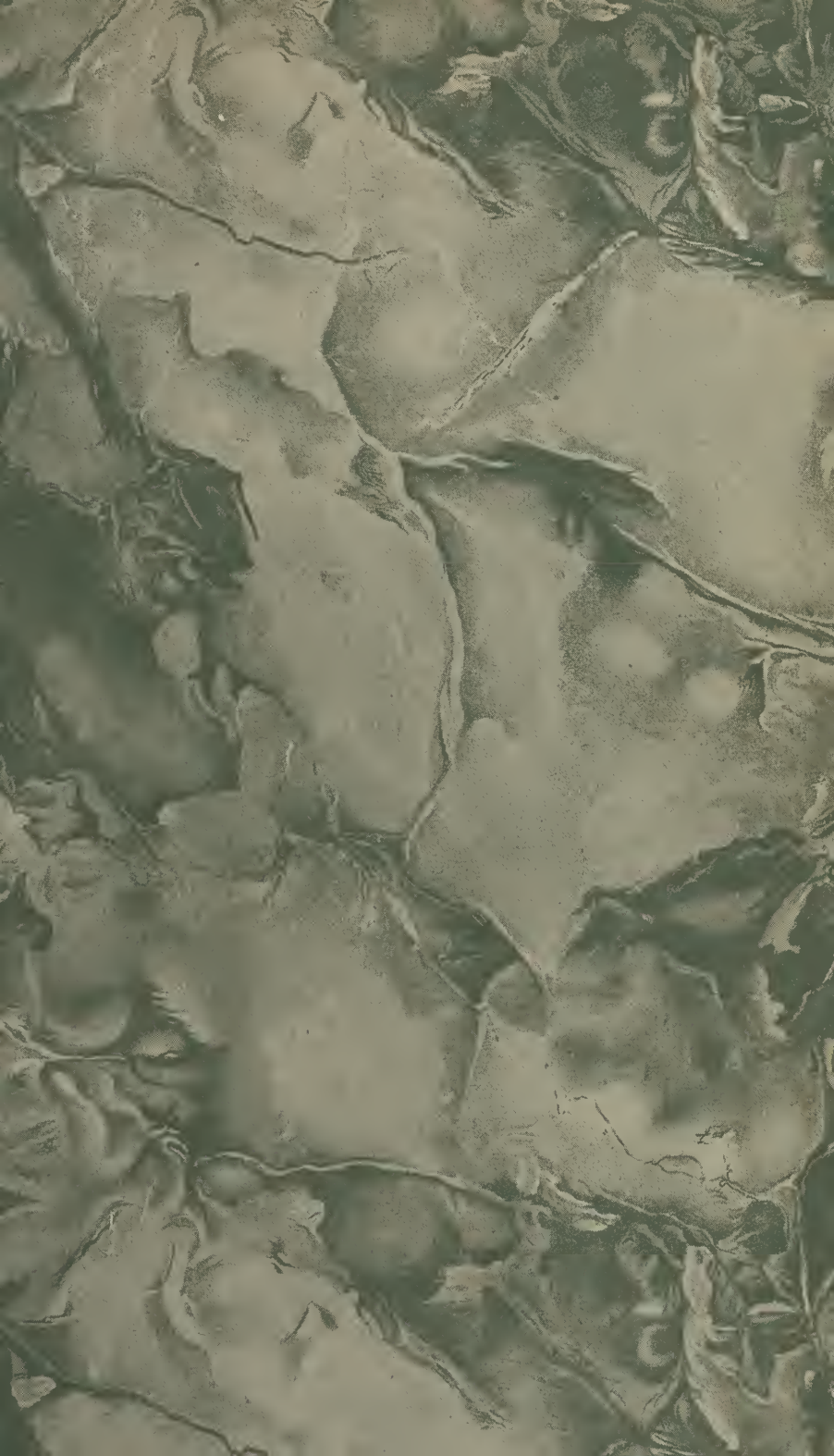
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THE DOCTOR

By Fildes

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THE
HOME PHYSICIAN
AND GUIDE TO HEALTH ✓

A Treatise on the Prevention and Cure of Disease; Not Intended to Take the Place of the Family Physician, but to Aid the Reader in Coöperating with Him Intelligently

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1923

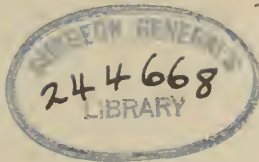
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"The Home Physician and Guide to Health" has been written by a large staff of skilled physicians who have presented every phase of the subject from the standpoint of the specialist. Each chapter has been composed by one peculiarly fitted for the task.

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PREFACE

"Those whom the gods love die young," said the ancients. But modern medical science has changed the proverb to read, "Those who ignore the laws of health die prematurely." And the years as they go by prove the accuracy of this revision.

Our modern world presents a strange paradox. Men work with all the energy of their being to amass a fortune, so that they may live in ease and comfort in the autumn of life. But they have no more than ceased from their strenuous labors, when some disease overtakes them, and they go the way of all flesh, and their hard earned dollars go to another. They forgot that "health is the greatest wealth," and wasted it in their attempt to accumulate gold and silver, stocks and bonds. Every day men are paying with their lives for such spendthriftiness. Every day men are going into physical bankruptcy because they have squandered their capital, health, without which no real success, either financial or physical, is possible. "Sickness is poor-spirited; it must husband its resources to live. But health answers its own ends and has to spare."

How foolish, then, is the course that so many pursue! For what pleasure can a million of money give if the body be racked with pain! Or of what value are extensive property holdings in a great metropolis if an outraged constitution commits the offender to a narrow lot in a city of the dead!

It has well been said that "to keep the body in a healthy condition, to develop its strength, that all its machinery may act harmoniously, should be the first study of our lives." Too many not only do not make this the "first study" of their lives, they fail to study it at all. They proceed on the theory that their body, being sound when they start out in life, will remain so to the end of their days, despite the treatment it receives. But the theory is based on gross ignorance of certain facts, such as the increasing degeneracy of the race, and the artificial diet that our civilization has created.

If our modern age of efficiency and higher education has taught us one thing, it is that success and development are possible in any line to those only who study the subject thoroughly and act upon the principles discovered in such study. Even so with health. Real physical well-being is rarely the result of chance. It comes rather from following, either consciously or instinctively, definite rules.

There are those who will dispute this statement. They recall, perhaps, some "character" of their town who violated almost

every law of health during a long life, yet apparently never suffered any physical discomforts or ailments. All that need be said of such a person is that he must have had an extraordinarily tough constitution, and such a notable exception but proves the rule. One such case can never begin to balance the thousands of others in which transgression of some simple principle of life has brought the offenders to untimely graves.

But despite the apathy of some toward the great subject of life and health and the prevention and cure of disease, there is a marked awakening on the part of men and women in every land to the need of educating themselves on these vital subjects. They are finding that the time thus spent is far more than offset by the reduction of days consumed by sickness, and that the money invested in such study pays big dividends in decreased doctor bills and smaller life insurance premiums. Men are beginning to realize that most gratifying results follow from taking an intelligent interest in the welfare of their bodies.

Formerly about the only kind of literature put out for the laity, on this subject, dealt wholly with sets of rules, which were generally prefaced with the suggestive phrase, "What to do before the doctor comes." To-day men are asking that the scope be enlarged to include a full discussion of what to do, and how to live, to make unnecessary the doctor's coming. They desire that the matter be presented to them in a simple yet scientific form. They ask that the latest findings of scientists be translated into terms which can be easily understood, and adapted to everyday life.

This volume is the answer to such a request. Indeed, it is the result of an insistent demand on the part of men everywhere, who have failed to find in the many popular medical books that which they desire. Written not by one doctor but by a large staff of skilled physicians, it presents every phase of the subject from the standpoint of the specialist. Each chapter has been composed by one peculiarly fitted for the task.

Many pages are devoted to the great principles underlying health and happiness. Much is said concerning the prevention as well as the cure of disease. Yet this volume is intended, not to take the place of the family physician, but to enable the layman to coöperate with him in an intelligent way. Little has been said about medicine in the cure of disease. This is in harmony with the latest findings of medical men, who are turning from drugs to such rational methods of treatment as are described in this book.

THE PUBLISHERS.

CONTENTS

SECTION I

CHAPTER 1. TRIALS AND TRIUMPHS OF MEDICINE . . 33-50

Benefactors of mankind maligned. Horrors of smallpox. Edward Jenner. Discovery of smallpox vaccine. Antivaccinationists. Ancient surgery. Modern surgery. Discovery of salvarsan. Discovery of lock-jaw germ. Antidiphtheritic serum. Discovery of serum for meningitis. Discovery of tuberculosis germ. Discovery of malarial parasite. Louis Pasteur. Anthrax vaccine. Discovery of cure for hydrophobia.

CHAPTER 2. THE BODY'S DEFENSIVE MECHANISM . . 51-58

General sanitation. Sterilization and isolation. Skin and mucous membrane. Nasal secretions. Saliva. Cells of windpipe. Gastric juice as disinfectant. Regulation of body temperature. Lymph glands as body defenses. Tonsils. Swelling of glands. The blood as a body defense. Blood plasma. Immunity from disease. Susceptibility of certain races to disease. Amœba. Phagocytes. Antitoxins. Antivenom.

CHAPTER 3. RELIGION AND HEALTH 59-64

Health a priceless treasure. Power of choice. Surrender of will to appetite. Length of human life. Health not a matter of chance. Definition of health. Worry. Fear. Diet and health.

CHAPTER 4. RECREATION AND HEALTH 65-74

Vocation. Avocation. Vacations. Complexion improvers. God's out-of-doors. Sea air. Exercise. Meals of fresh air. Sleep. Sleep caused by auto-intoxication. Sleeping porch. Time needed for sleep. Do not worry. Insomnia. Value of prayer.

CHAPTER 5. RISING TIDE OF PHYSICAL DEGENERACY . . 75-88

Unwarranted optimism as to average length of life. Decline of death rate in America. World war and longevity. Increased insanity. Death rate from heart disease. Mortality from hardening of arteries. Increase of Bright's disease. Death rate from cancer. Toll of tuberculosis. Ravages of venereal disease. Diminishing birth rate. Early decay of teeth. Faulty eyesight and hearing. Increase of deaf mutes and epileptics. Deadly poisons. Alcohol and tobacco. The drug habit. Patent medicines. Annual consumption of coffee, tea, cocoa.

CHAPTER 6. PERSONAL HYGIENE 89-96

Skin an important organ. Diet and skin hygiene. Effect of sleep and exercise on skin. Bathing. Cold bath. Warm bath. Massage of skin. Care of skin of face. Clothing. Color of clothing. Clothing for bodily extremities. Feet. Unhygienic shoes.

CHAPTER 7. THE MINISTRY OF THE PHYSICIAN . . 97-101

Choosing a physician. Advertising doctors. Strenuous life of physician. Educational work of doctor. Physician's charges. Division of fees. The "specialist."

SECTION II

CHAPTER 8. LOCATION AND CONSTRUCTION . . . 102-111

Location of home. Construction. Floor. Window space. Lighting. Screens. Bath and toilet. Medicine cupboard. Menace of fires. Kitchen. Food closet. Ventilation of home. Heating. Open fireplaces. Gas and oil heaters. Hot-air furnaces. Steam and hot-water radiators.

CHAPTER 9. A CLEAN HOME . . . 112-120

Water supply. Purification of water. Boiling. Distillation. Filtration. Chemical methods of purification. Bacteria in water. Disposal of sewage. Surface disposal. Cesspool. Septic tank. Vaulted privy. Pail. Passing on.

SECTION III

CHAPTER 10. HYDROTHERAPY . . . 121-152

Importance of hydrotherapy in treatment of disease. Effects of hot and cold water. Reaction. Lessening congestion. Hydrotherapy for fevers. Effect of hot and cold water on internal organs; on blood; on glands. Equipment for home treatments. Common names of temperatures. Fomentations. Patient and bed. Stupe. Revulsive compress. Cold compress. Ice bags and caps. Heating compress. Moist chest pack. Square chest pack. Protected chest pack. Dry chest pack. Moist abdominal bandage. Heating throat compress ("cold cloth around the neck"). Heating joint compress. Medicated compresses. Poultices. Tonic friction. Cold mitten friction. Wet hand rub. Cold towel rub. Salt glow. Sponging. Saline sponge. Alkaline sponge. Vinegar and salt rub. Alcohol rub. Witch-hazel rub. Hot foot bath. Mustard foot bath. Alternate hot and cold foot bath. Hot leg bath. Alternate hot and cold leg bath. Hot and cold arm bath. Cold rubbing sitz bath. Hot sitz bath. Revulsive sitz bath. Hot half bath. Full tub bath. Hot tub bath. Neutral bath. Cold bath. Brand bath. Graduated bath. Electric tub bath. Medicated baths. Saline bath. Alkaline bath. Nauheim bath. Russian, Turkish, and electric light baths. Hot blanket pack. Hot trunk pack. Hot leg pack. Wet sheet pack. Neutral pack. Heating trunk pack. Sprays and douches.

CHAPTER 11. MASSAGE, ELECTROTHERAPY, PHOTOTHERAPY, RADIOTHERAPY . . . 153-161

Massage in the home. Massage movements. Compression. Stroking. Kneading. Percussion. Joint movements. Electrophoresis. Faradism. Strength and duration of electric current. Phototherapy. Physiological effects. Photophore. Sun bath. Radiotherapy. Röntgen ray examination. X ray treatment.

CHAPTER 12. SIMPLE MEDICINAL AGENCIES . . . 162-166

Cathartics. Stimulants. Hypnotics, or sleep producers. Analgesics, or pain destroyers. Emetics. Disinfectants and antiseptics. Medicated steam. Atomizers and solutions. Mouth washes. Toothache drops. Earache drops. Family medical supply.

CHAPTER 13. THE PLACE OF SURGERY IN THE CURE OF DISEASE 167-172

Advancement in surgery. Discovery of anæsthesia. Surgical standards. Standardized hospitals. Conservatism in surgery.

CHAPTER 14. CARE OF THE SICK 173-192

Sick room. Location. Ventilation. Patient's attendant. Bed making. Pillows. Personal care of patient. Taking temperature and pulse. Care of mouth and teeth. Bowels. Bathing. Dressing patient. Administration of medicine. Feeding the sick. Care of contagious cases. Fumigation.

SECTION IV

CHAPTER 15. BLEEDING, FRACTURES, AND BURNS . . . 193-206

Pain. Hemorrhage. Infection. How to stop bleeding. Bandaging eye; head. Burns. Prevention of infection in wounds. Bandaging hand and arm; foot and ankle; knee; leg. Fractures. Dislocations.

CHAPTER 16. UNCONSCIOUSNESS FROM VARIOUS CAUSES 207-216

Fainting. Heart disease. Brain injury. Apoplexy. Epilepsy. Alcoholism. Heat exhaustion. Sunstroke. Freezing. Shock (common). Electric shock. Gas suffocation. Drowning. Artificial respiration. Poisoning. Uræmic poisoning. Convulsions of hysteria.

CHAPTER 17. POISONING 217-227

Classes of poisons. Corrosive poisons. Irritant poisons. Nerve poisons. Mercury. Carbolic acid. Lysol. Arsenic. Headache powders. Strychnine (nux vomica). Phosphorus. Opium. Lead. Wood alcohol. Naphtha. Food. Mushrooms. Botulism. Snake bites. Spider bites. Insect bites.

CHAPTER 18. MISCELLANEOUS AILMENTS 228-235

Ingrowing toenail. Chilblains. Frostbite. Nail inflammation. Anaphylaxis. Harelip. Cleft palate. Hernia. Hiccough. Dust diseases. Mountain sickness. Caisson disease.

SECTION V

CHAPTER 19. HUNGER AND APPETITE 236-240

Hunger. Peristalsis. Hunger pains. Appetite. Highly seasoned food. Sweets. Appetite as a guide. Appetite and disease. Failure to control appetite. Tabulation of common foods. Cost per pound. Calories per pound. Cost per 1,000 calories.

CHAPTER 20. FOOD ELEMENTS AND VALUES 241-250

Definition of food. Classes of food elements. Proteins. Amino acids. Protein needed daily. Digestion of protein. Table of foods high in protein. Fats. Low protein diet. High protein diet. Table of foods high in fat. Carbohydrates. Cellulose. Digestion of carbohydrates. Carbohydrates in blood. Table of foods high in carbohydrates. Inorganic salts. Daily requirement of mineral elements. Foods rich and

poor in inorganic salts. Vitamines. Water. Oxygen. Measurements of food value. Definition of calorie. Economic value of foods. Balanced rations. Chittenden standard. Simple menus.

CHAPTER 21. HYGIENE OF EATING AND DRINKING . . . 251-256

Body made from food. Relation of food to health. Physicians see value of diet. Preparation and care of food. Purpose of eating. Simplicity in eating. Combination of foods. Favorable and unfavorable combinations. Stimulating beverages. Condiments. Use of liquids at meals. Time of eating. Influence of mind on digestion.

CHAPTER 22. FACTS ON DIET FOR ALL CLASSES . . . 257-265

Composition of body compared with earth. Ideal diet. Amount of food needed daily. Dietaries of different races. Basis for judging food. Dietetics for children. Food requirement of average child. Height-weight chart. Food for laborers; brain workers. Diet for aged. Average weight of aged. Influence of season on food intake. Influence of climate. Diet in sickness.

CHAPTER 23. DIET AND NUTRITIONAL DISEASES . . . 266-276

Vitamines. Distribution of vitamins. Beriberi. Food experiments on pigeons. Scurvy. Infantile scurvy. Pellagra. Rickets. Protective foods. Rules to prevent deficiency in diet. Foods rich in vitamins.

CHAPTER 24. PRESERVATION AND ADULTERATION . . . 277-284

Methods for preserving foods. Physical methods; chemical. Preservatives. Adulteration of foods. Table of food adulterations. Misbranding of food. Artificial coloring matter. Artificial sweeteners.

CHAPTER 25. VEGETARIANISM 285-291

Lacto-vegetarian dietary. Protein standards. Endurance tests. Meats a substitute for nuts. Meat a stimulant. Economy of vegetarianism. Meat an acid-forming food; a putrefactive food. Prevalence of disease in animals. Cooking meat to destroy germs. High protein and degenerative diseases. Cancer and meat eating. Is meat a necessity?

SECTION VI

CHAPTER 26. PHYSIOLOGY OF DIGESTION 292-300

Complex form of body nourishment. Mastication. Salivary digestion. Ptyalin. Maltase. Stomach. Digestive enzymes. Duodenum. Pylorus. Hydrochloric acid. Pepsin. Rennin. Liver. Gall bladder. Pancreas. Trypsin. Steapsin. Amylopsin. Intestine. Erepsin. Invertase. Lactase. Jejunum. Ileum. Cæcum. Absorption of food. Influence of nervous system on digestion.

CHAPTER 27. DISEASES OF MOUTH AND ESOPHAGUS . . . 301-308

Care of teeth. Cold sore or fever blister. Inflammation of mouth. Thrush. Gangrenous sore mouth. Acute inflammation of tongue. Malocclusion. Impaction. Decay of teeth. Pyorrhea. Narrowing of esophagus. Cancer of esophagus. Spasm of esophagus. Diverticula. Foreign bodies in esophagus. Ulcers in esophagus.

CHAPTER 28. DISEASES OF THE STOMACH 309-315

Indigestion. Fermentation in stomach; in bowels. Blood purifiers. Sour stomach, or heartburn. Absence of acid. Gastralgia (spasm of stomach). Ulcer of stomach. Hemorrhage from stomach. Vomiting. Perforation of stomach wall. Sippy treatment.

CHAPTER 29. DISEASES OF THE INTESTINES 316-330

Constipation. Lack of bulk in diet. Lack of fruits. Heedlessness of nature's warnings. Evacuation. Cathartic habit. Enema habit. Indigestion. Dyspepsia. Foods for constipation. Abdominal massage. Appendicitis. Surgery for appendicitis. Interval operations. Inflammation of colon. Diet lists for colitis. Flaxseed tea. Intestinal powder. Acute diarrhea. Chronic diarrhea. Intussusception. Volvulus. Piles. Rectal abscesses. Itching anus. Fissure.

CHAPTER 30. INTESTINAL WORMS 331-342

Pork tapeworm. Beef tapeworm. Raw meat cure fads. Fish or Russian tapeworm. Dwarf tapeworm. Hydatid cysts. Common roundworms. Pinworms, seat worms, or threadworms. Whipworms. Hookworms. Eradication of hookworms. Foot itch, toe itch, ground itch, dew poison, or water itch. Trichina. Treatment for intestinal worms.

CHAPTER 31. DISEASES OF LIVER AND PANCREAS . . 343-351

Hardening of liver. Jaundice. Malignant jaundice, or acute yellow atrophy. Catarrhal jaundice. Gallstones. Inflammation of gall bladder. Congestion of liver. Biliousness. Cancer of liver. Abscesses of liver. Inflammation of pancreas. Cancer of pancreas.

SECTION VII

CHAPTER 32. PHYSIOLOGY OF CIRCULATION 352-358

Cells. Elements of blood. Red blood corpuscles. Carbonic acid gas. White corpuscles. Heart. Pulmonary circulation. Why the heart beats. Capillary system. Effect of weather on circulation. Pulse.

CHAPTER 33. DISEASES OF THE HEART 359-366

Rheumatic group. Inflammation of lining of heart. Inflammation of covering of heart. Regurgitation. Syphilitic group. Arteriosclerotic and high-blood-pressure group. Fatty heart. Functional group. Palpitation. Rapid heart. Enlargement of heart. Probable outcome of heart trouble. Treatment for heart trouble. Drugs for heart trouble.

CHAPTER 34. DISEASES OF ARTERIES AND VEINS . . 367-375

High blood pressure. Hardening of arteries. Transient lameness. Enlargement or bulging of artery. Apoplexy. Varicose veins. Phlebitis. Swelling of leg. Eczema of skin of leg. Ulcer of leg. Varicocele.

CHAPTER 35. DISEASES OF THE BLOOD 376-382

Structure of blood. Composition. Corpuscles. Leucocytosis. Clotting of blood. Examination of blood. Congestion of blood vessels. Anæmia. Greensickness. Leukæmia. Hemorrhages into skin. How to recognize hemorrhage. Hemorrhagic diseases of newborn child. "Bleeders."

SECTION VIII

CHAPTER 36. DISEASES OF THE LYMPH GLANDS . . . 383-388

Spleen. Thymus gland. Lymph nodes. Enlargement of lymph glands. "Kernels" under skin. Glandular fever. Tuberculous infection of glands. Syphilitic infection of glands. Hodgkin's disease. Secondary tumors. Simple lymphoma. Enlargement of spleen. Status lymphaticus.

CHAPTER 37. DISORDERS OF THE DUCTLESS GLANDS . . . 389-401

Metabolism. Glands of internal secretion. Hormones. Thyroid gland. Thymus. Pituitary. Spleen. Adrenal. Sex. Parathyroid. Pineal. Secretin. Disorders of the thyroid. Goiter. Hypothyroidism. Hyperthyroidism. Exophthalmic goiter. Goiter districts. Adrenin. Hypoadrenia. Hyperadrenia. Addison's disease. Acromegaly. Giantism. Ovarian disorders. Sterility. Menstrual disorders. Hyperovarism.

SECTION IX

CHAPTER 38. PHYSIOLOGY OF THE NERVOUS SYSTEM 402-408

Nerve tissue. Nerve cells. Dendrites. Brain. Gray matter. Cerebrum. Lobes. Brain an electric dynamo. Brain of baby. Brain development.

CHAPTER 39. NERVOUS DISORDERS AND DISEASES . . . 409-435

Neuralgia. Facial. Intercostal. Sciatica. Ovarian. Neuritis. Shingles. Nervous prostration or exhaustion. Morbid obsessions. St. Vitus's dance. Dizziness. Epilepsy. Hysteria. Writer's cramp. Insomnia. Nerve sedatives. Railway spine. Habit spasm. Headaches. Migraine. Meningitis. Tubercular. Epidemic. Encephalitis. Infantile paralysis. Syphilis of nervous system. Interstitial syphilis. General paralysis of the insane. Brain tumors. Tumors of the spinal cord. Shaking palsy.

CHAPTER 40. FEEBLE-MINDEDNESS 436-448

Average intelligence. Mental age of soldiers. Mental limitations. Measuring intelligence. Binet-Simon test. Industrial classification of feeble-minded. Intelligence tests. Moral imbeciles. Mongolianism. Cretinism. Paralytic children. Ataxic children. Little's disease. Idiot savants. Adolescent insanity. Causes of feeble-mindedness. Heredity. Accident. Training of feeble-minded. Sex problems of feeble-minded.

CHAPTER 41. INSANITY 449-455

Causes of insanity. Defective heredity. Early training. Education. Habits of thinking. Care of the insane. Private institutional treatment. State hospital care.

SECTION X

CHAPTER 42. PHYSIOLOGY OF RESPIRATION . . . 456-460

Oxygen. Carbon dioxide. Thoracic cavity. Ribs. Diaphragm. Lungs. Air sacs. Bronchi. Windpipe. Transfer of oxygen and carbon dioxide. Respiration. Protective agencies in respiratory system.

CHAPTER 43. DISEASES OF LUNGS AND PLEURA . . . 461-476

Pneumonia. Lung fever, or croupous pneumonia. Garments for pneumonia patients. Broncho-pneumonia. Serums for pneumonia. Pleurisy. Empyema. Abscess of lung. Influenza, Spanish influenza, grippe, la grippe. Immunity from influenza. Influenzal pneumonia.

CONTENTS

13

CHAPTER 44. DISEASES OF THE THROAT 477-488

Sore throat. Tonsillitis. Quinsy. Enlarged tonsils. Adenoids. Acute earache. "Running from the ear." Mouth-breathing. Glandular fever. Hay fever, or rose cold. Bronchial asthma. Dunbar's serum. Laryngitis. Diphtheria. Antidiphtheritic serum. Diphtheria carriers. Schick test. Paralysis of diphtheria. Membranous croup. Whooping cough. Medicated steam for whooping cough. Whooping cough vaccine.

CHAPTER 45. DISEASES OF THE AIR PASSAGES . . . 489-492

Coughs. Cough sirups. Bronchitis. Bronchial asthma. Change of climate for bronchial asthma. Drugs for bronchial asthma.

CHAPTER 46. TUBERCULOSIS (GENERAL) 493-501

Definition of infectious disease. Definition of contagious disease. Scope of tuberculosis. Tuberculosis preventable and curable. Manner of infection. Immunity from tuberculosis. Children and tuberculous infection. Relative mortality in different ages. Tuberculous milk. Tuberculin tested cows. Pasteurization. Tuberculosis of lymph glands; joints and bones; peritoneum; throat. Tubercular meningitis. Tuberculosis of kidney.

CHAPTER 47. TUBERCULOSIS OF THE LUNGS 502-512

Death rate from tuberculosis. Necessity of early recognition of tuberculosis. Climate a small factor in cure. Relation between physician and patient. Rest cure. Tuberculosis sanatoriums. Per cent of recoveries. Fresh air for consumptives. Fresh-air porch. Window tent. Night sweats of consumption. Coughing. Vomiting. Don't get tuberculosis yourself. Rules for cure. Rules to prevent spread of tuberculosis.

SECTION XI

CHAPTER 48. DISEASES OF THE JOINTS 513-522

Ligaments. Cartilages. Synovial membrane. Synovial fluid. Synovitis. Kneecap, or patella. Sprains. Rupture of small blood vessels. Bursitis. Tuberculous arthritis. Hip joint disease. White swelling. Pott's disease. Acute arthritis. Rheumatic fever. Acute rheumatism. Uric acid. Faulty proteid metabolism. Arthritis deformans. Gonorrheal arthritis, or gonorrheal rheumatism. Ankylosis. Bunions.

CHAPTER 49. AFFECTIONS OF BONES, MUSCLES, AND TENDONS 523-532

Acute osteomyelitis. A disease of childhood. Spinal curvature. More common among women than among men. Result of lack of exercise in growing children. Result of too low or too high school seats. Structural scoliosis. Exercise for spinal curvature. Round shoulders. Due to habit. Result of obstruction in respiratory passages. Result of wrong kind of clothing. Spinal braces. Shoulder braces. Whitley exercisers. "Setting up" exercises. Wryneck. Surgery for wryneck. Flat foot. Functions of foot. Arches. Shoes for flat foot. Arch supports. Myalgia. Bruises. Need of careful examination following severe bruises. Strains.

SECTION XII

CHAPTER 50. BACTERIAL DISEASES OF THE SKIN . . . 533-539

Blackheads. Oil glands of skin. "Flesh worms." Comedo extractor. Pimples. Oily seborrhea. Oversecretion of sebaceous glands. Dandruff, or dry seborrhea. Boils. Vaccine for boils. Carbuncle. Impetigo.

- CHAPTER 51. PARASITIC DISEASES OF THE SKIN . . . 540-546
 Scabies. Itch mite. "Seven-year itch." Lousiness. Head louse. Body louse. Crab louse. Ringworm of the scalp. Ringworm of the body. Barber's itch. Tinea versicolor. Prescriptions for tinea versicolor.
- CHAPTER 52. CONSTITUTIONAL DISEASES OF THE SKIN 547-555
 Hives. Psoriasis. Pemphigus. Tetter, or salt rheum (eczema). Erythematous eczema. Papular eczema. Vesicular eczema. Pustular eczema. Eczema rubrum. Chronic or squamous eczema. Prescriptions for eczema. Lupus vulgaris. Lupus erythematosus.
- CHAPTER 53. VARIOUS DISORDERS OF THE SKIN . . . 556-562
 Warts. Corns. Poison ivy. Poison oak. Itching. Prickly heat. Sunburn. Chafing. Wens. Gray hair. Baldness.

SECTION XIII

- CHAPTER 54. DISEASES OF THE EYE 563-571
 Chronic inflammation of margin of eyelids. Sty. Chalazion. "Black eye." Insect bites on eyelids. Watery eye. Conjunctivitis. "Pink eye." Gonorrheal conjunctivitis. Chronic conjunctivitis. Granulation of eyelids. Ulcer of cornea. Inflammation of iris. Cataract. Pterygium. Foreign body in eye.
- CHAPTER 55. DISEASES OF THE EAR 572-578
 Tests for hearing. Cause of deafness. Infection of external auditory canal. Impacted earwax. Gathering in ear. Mastoiditis. Chronic discharge of middle ear. Ringing in ear. Foreign body in ear.
- CHAPTER 56. DISEASES OF THE NOSE 579-585
 Nerve endings of sense of smell. Lymphatics of nose. Colds. Simple chronic catarrh of nose. Obstruction of nose. Nosebleed. Ulceration in nose.

SECTION XIV

- CHAPTER 57. PHYSIOLOGY OF THE URINARY ORGANS . 586-592
 Kidneys. Size. Weight. External appearance. Internal structure. Blood supply of kidneys. Nerve supply. Urine. How to obtain urine sample for examination. Characteristics of normal urine. Composition of urine. Abnormal constituents of urine. Ureters. Bladder. Urethra.
- CHAPTER 58. DISEASES OF THE KIDNEYS 593-600
 Acute nephritis, or Bright's disease. Chronic nephritis. Pyelitis. Floating kidney. Tumors of kidney. Cysts. Stones in kidney. X ray examination for stones.
- CHAPTER 59. DISEASES OF THE BLADDER 601-604
 Cystitis. Tumors of bladder. Stones in bladder. Incontinence of urine. Generally amenable to treatment. Surgery sometimes required. Frequent complication of locomotor ataxia.

SECTION XV

- CHAPTER 60. DISEASES OF THE MALE ORGANS . . . 605-608
 Hydrocele. Varicocele. Enlargements of prostate gland. Medicine valueless. Surgery only effective treatment. Impotence. Sterility. Interstitial gland.

CHAPTER 61. DISEASES OF THE FEMALE ORGANS . . . 609-620

Displacements of uterus. Knee-chest position. Tumors of uterus. Uterine polypi. Tumors of ovary. Cysts in ovary. Infections of uterus, tubes, and ovaries. Hemorrhages from uterus. Curettage. Leucorrhea. Cervical lacerations. Cancer of cervix. Vulvitis. Vaginitis. Bartholinitis. Lacerations of perineum. Rectocele. Cystocele.

CHAPTER 62. DISEASES OF THE BREAST . . . 621-624

Glandular structure. Inflammation of breast. Cracking of nipples. Breast pump. Unnatural enlargement of breast. Tumors of breast. Chronic cystic mastitis.

CHAPTER 63. MENSTRUAL DISORDERS . . . 625-633

Puberty. Normal menstruation. Absence of menstruation. Excessive menstruation. Painful menstruation. Precocious menstruation. Menopause. Duration of menopause.

SECTION XVI

CHAPTER 64. PREGNANCY AND CHILDBIRTH . . . 634-649

Changes in uterus during pregnancy. Changes in blood, lungs, urine, skin, teeth, taste. Morning sickness. Changes in nervous system. Diagnosis of pregnancy. Time of confinement. Hygiene of pregnant woman. Toxæmia. Bathing. Care of genitals. Breast. Engagement of nurse. Determination of sex. Abortions. Extra-uterine pregnancy. Delivery in absence of physician.

CHAPTER 65. THE BABY . . . 650-667

Measurements of normal baby. Anatomy of baby. Baby's development. Teething chart. Bathing the baby. Clothing the baby. The nursery. Feeding the baby. Weaning. Artificial feeding. Amount at each feeding. Constituents of milk. Sample formulas. Care of eyes, nose, ears, privates.

CHAPTER 66. THE SICK BABY . . . 668-676

Colic. Constipation. Teething. Hiccough. Convulsions. Epilepsy. Summer diarrhea. Cholera infantum. Dysentery. Colds. Croup. Bronchitis. Pneumonia. Chafing. Bed wetting — incontinence of urine.

SECTION XVII

CHAPTER 67. SOURCES AND MODES OF INFECTION . . 677-696

Body resistance to disease. Common sources of infection. Man as a carrier of disease. Insects and disease. Mosquitoes and malaria. Habits of malaria mosquito. Combating malaria. Quinine for malaria. Mosquitoes and yellow fever. Prevention of yellow fever. Fleas and plague. Measures against fleas and rats. Flies. Habits and development of fly. Capacity of fly for carrying disease. Methods of suppression of fly. Tsetse fly and sleeping sickness. Ticks and mites. Relapsing fever. Rocky Mountain spotted fever. Prevention of infectious diseases.

CHAPTER 68. ERUPTIONS AND CONTAGIOUS DISEASES . 697-711

Scarlet fever. Scarletina. Earache from scarlet fever. Measles. German measles. Smallpox. Confluent smallpox. Hemorrhagic type of smallpox. Varioloid. Chicken pox. Mumps.

- CHAPTER 69. TYPHOID FEVER 712-716
 Nervous, intestinal, and respiratory symptoms of typhoid. Symptoms of bowel perforation. Walking typhoid. General care of typhoid patient. Diet. Prevention of typhoid.
- CHAPTER 70. ERYSIPELAS AND WOUND INFECTION . . 717-725
 Erysipelas. Septic intoxication. Blood poisoning. Pyæmia. Infections of hand. Erysipelas of hand. Erysipeloid. Cellulitis. Infection of finger. Felon, or whitlow. Infections of joints of hand.
- CHAPTER 71. VENEREAL INFECTIONS 726-738
 Syphilis. Wassermann test. Salvarsan. Gonorrhea, or clap. Gonorrhea in the male. In the female. In children. Gonorrheal arthritis. Marriage and gonorrhea. Chaneroid. Herpes. Balanitis.

SECTION XVIII

- CHAPTER 72. TROPICAL DISEASES 739-752
 Yellow fever. Malta fever. Dengue. Filariasis. Elephantiasis. Yaws. Wassermann test for yaws. Madura foot. Relapsing fever. Salvarsan for relapsing fever. Leprosy. Chaulmoogra oil for leprosy.
- CHAPTER 73. TROPICAL DISEASES (CONTINUED) . . 753-766
 Black-water fever. Beriberi. Epidemic dropsy. Sprue. Kala azar. Infantile kala azar. Plague. Cholera. Dhobie itch. Bilharziosis. Oriental sore. Tropical ulcer.
- CHAPTER 74. PERSONAL HYGIENE IN TROPICAL COUNTRIES 767-772
 The house. Food and drink. Kitchen. Green vegetables. Clothing. Sun helmet. Sleeping. Vaccination.

SECTION XIX

- CHAPTER 75. CONSTITUTIONAL DISEASES 773-779
 Diseases of metabolism. Diabetes. Acidosis and diabetic coma. Test for urinary sugar. Obesity. Gout.
- CHAPTER 76. FOCAL INFECTION 780-792
 Teeth and tonsils. Pyorrhea. Alveolar abscesses. List of diseases due to streptococcus. Sources of infection. Brief accounts of cases of focal infection. Influence of focal infection on other diseases.
- CHAPTER 77. THE CANCER PROBLEM 793-802
 Deaths from cancer. Curability. Causes. Prevention and cure. Organs and parts affected. Stomach. Bowel and rectum. Uterus. Breast. Lips, tongue, and mouth. Skin.

COLOR PLATES

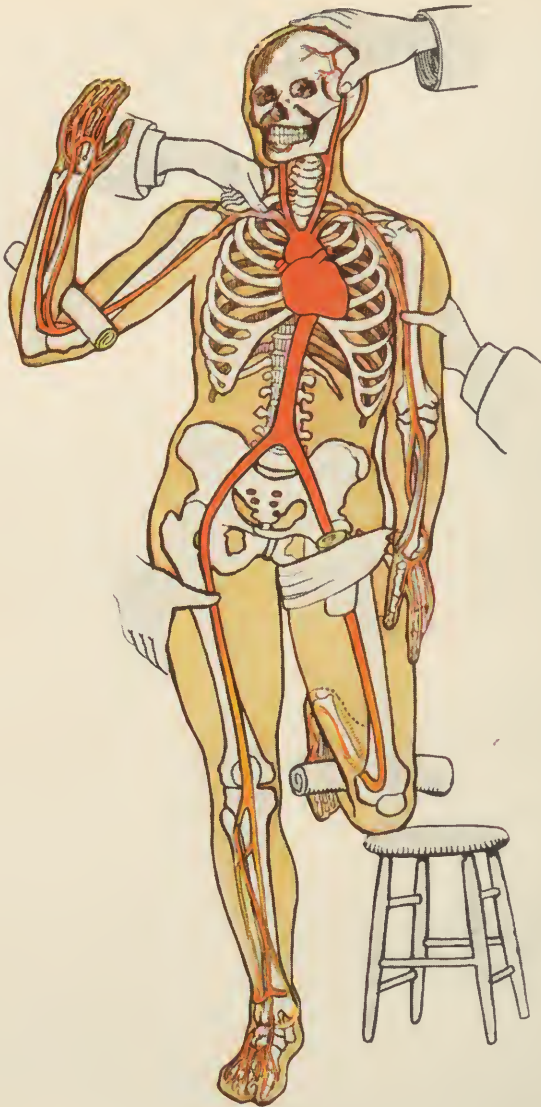
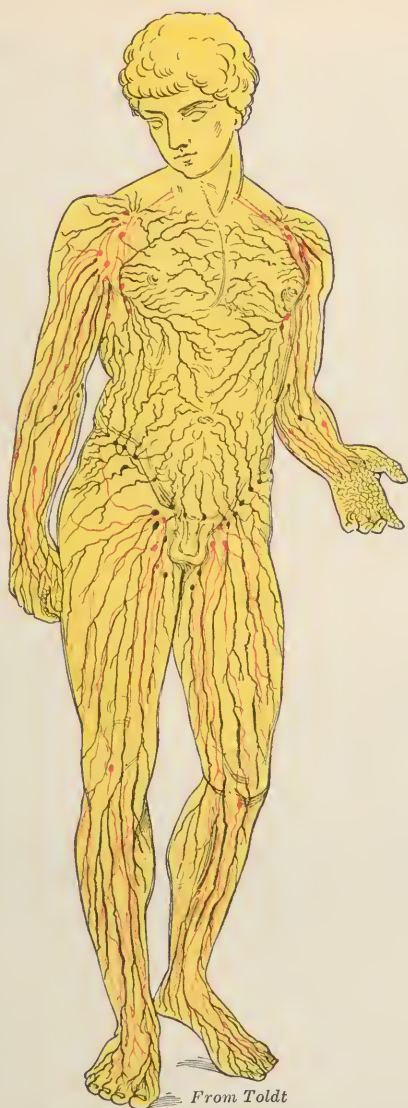


DIAGRAM SHOWING POINTS FOR PRESSURE TO
STOP BLEEDING
See page 195.

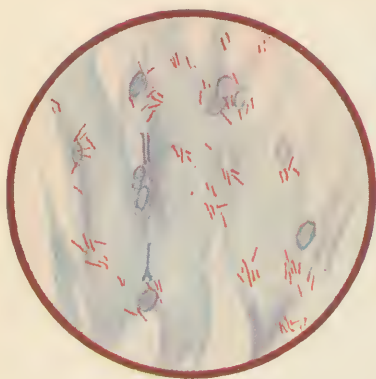


From Toldt

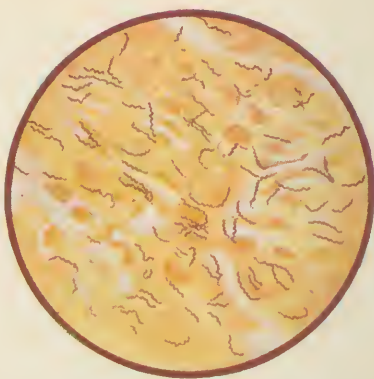
LYMPH GLANDS AND LYMPH CHANNELS OF THE BODY

In the region of the trunk, only the superficial channels are shown. In the arms and the legs, both the superficial and the deep glands and channels are shown. The superficial structures are in black, and the deep structures in red.

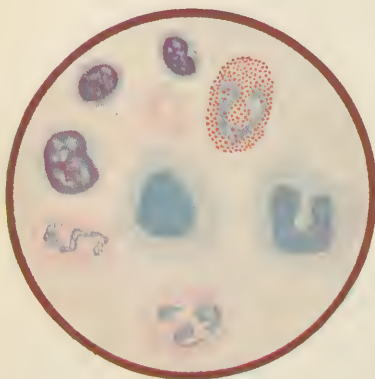
See page 383.



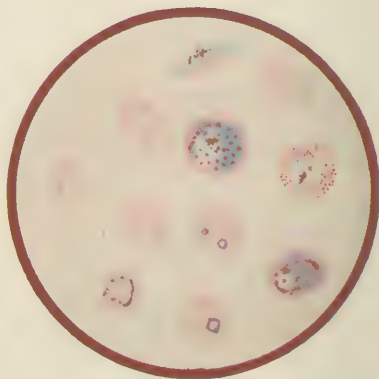
GERMS OF TUBERCULOSIS IN
SPUTUM. See page 494.



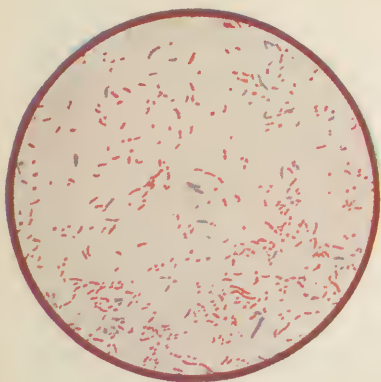
GERMS OF SYPHILIS IN TISSUE
See page 727.



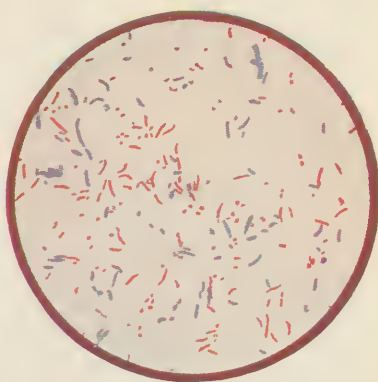
RED AND WHITE BLOOD CELLS
See page 377.



MALARIAL PARASITES IN BLOOD
See page 683.



Number 1



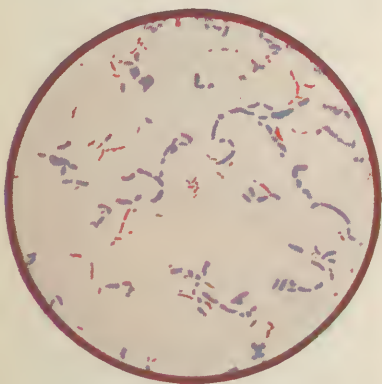
Number 2

INTESTINAL BACTERIA

See page 288.

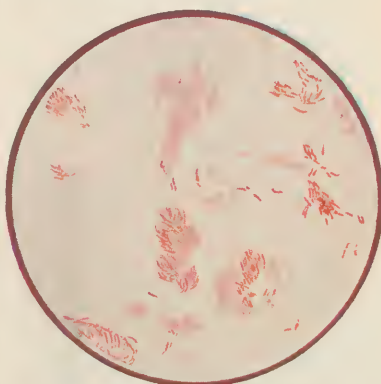
1. Bacteria from ordinary intestinal contents, showing many and varied forms of organisms. Some of these bacteria are capable of causing decomposition of food remnants, with the formation of poisonous materials.

2. Bacteria from the same intestinal tract four days after the beginning of the daily use of one quart of milk containing the acidophilus organism. Note that the flora has already begun to show marked changes. The number of unfavorable bacteria is reduced as the acidophilus, a form of "friendly germ," is increased.



Number 3

From Rettger and Cheplin



GERMS OF LEPROSY

See page 750.

3. Bacteria from the same individual after the use of acidophilus milk for eight days. Observe the marked simplification of the flora and the great increase in the number of the large rodlike, dark staining acidophilus organisms. These bacteria lessen the growth of the unfavorable germs, and thus combat the formation of poisonous chemical bodies. See page 288.



BLEPHARITIS MARGINALIS
See page 563.



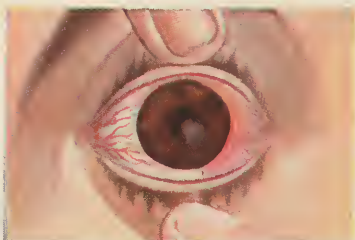
STY
See page 564.



CHALAZION
See page 564.



PINK EYE
See page 566.



ULCER OF CORNEA
See page 568.



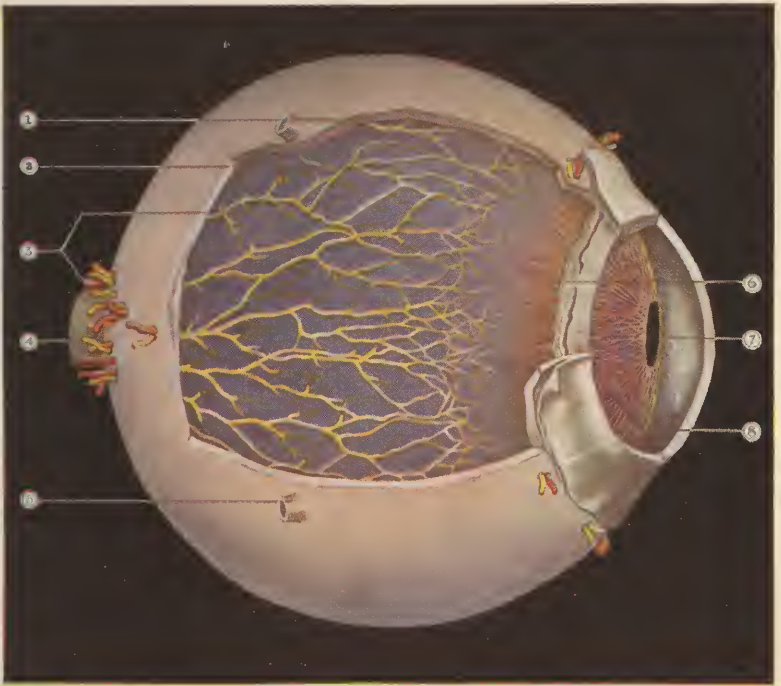
PTERYGIUM
See page 569.



SENILE CATARACT
See page 569.



IRITIS
See page 568.



ANATOMY OF THE EYE

See page 563.

- | | |
|-------------------|-------------------------------|
| 1. Sclerotic coat | 5. Large vein leaving eyeball |
| 2. Choroid coat | 6. Ciliary muscle |
| 3. Blood vessels | 7. Pupil |
| 4. Optic nerve | 8. Iris |



INFLAMED APPENDIX
Opened Showing a Foreign Body



INFLAMED APPENDIX
Appendicitis

See page 322.



(24) THROAT IN DIPHTHERIA
See page 485.

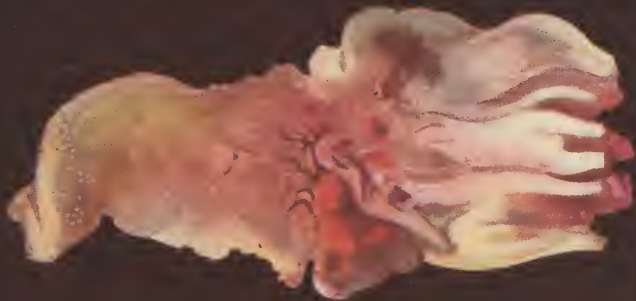


THROAT IN TONSILLITIS
See page 485.



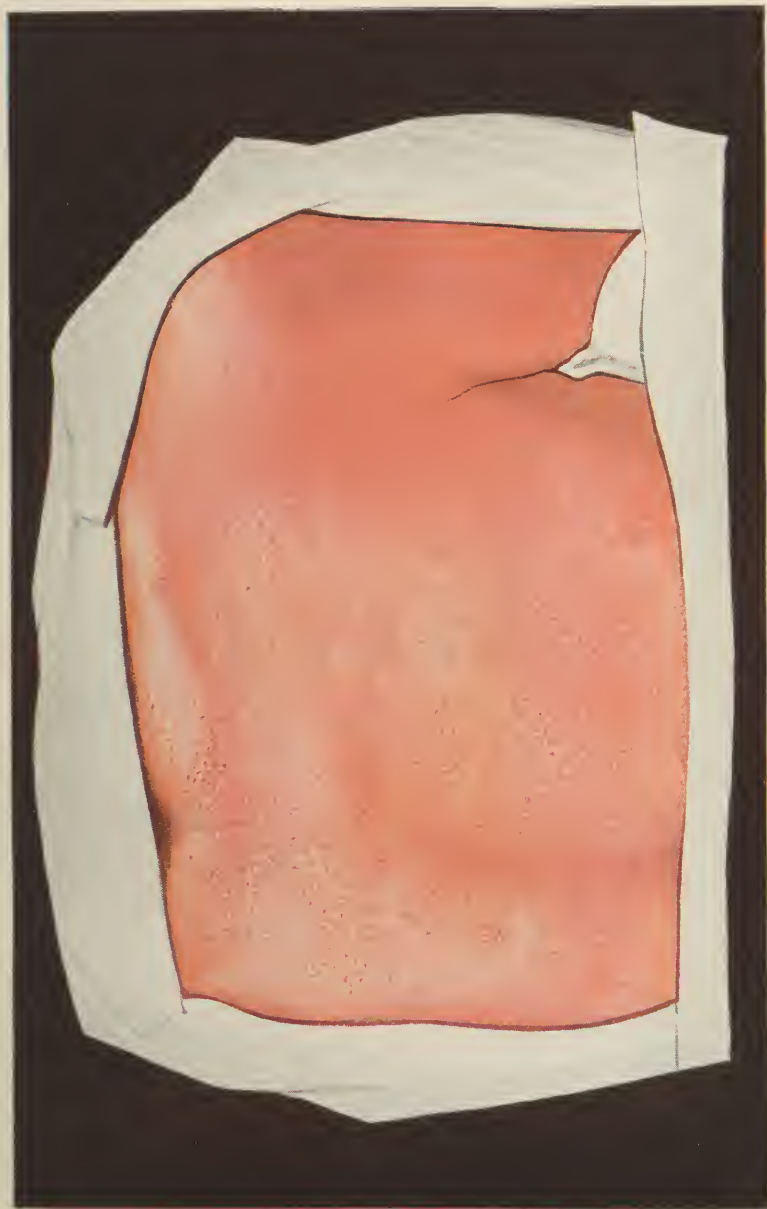
ABOVE:
VACCINATION AT FIVE AND AT EIGHT DAYS RESPECTIVELY
See page 708.

RIGHT:
DIPHTHERITIC MEMBRANE IN CAST FORM — MOLD OF
LARYNX AND THROAT
See page 484.





MEASLES
See page 702.



SCARLET FEVER
See page 698.



(28)

SMALLPOX (Variola)

See page 707.

CHICKEN POX

See page 709.



ECZEMA
See page 552.



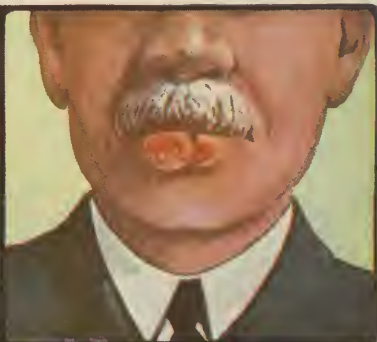
ERYSIPELAS
See page 717.



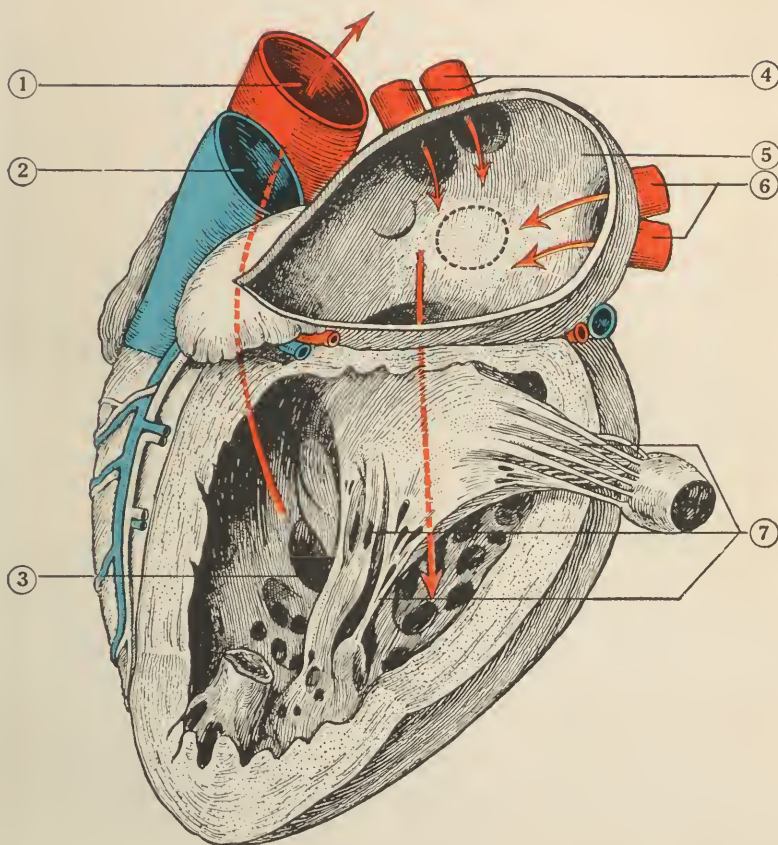
CANCER OF THE BREAST
See page 799.



CANCER OF THE TONGUE
See page 800.



CANCER OF THE LIP
See page 800.



LEFT AURICLE AND VENTRICLE OF THE HEART

Note the relative thickness of the walls.

See page 354.

1. Aorta
2. Pulmonary artery
3. Cavity of left ventricle
4. Right pulmonary veins
5. Left auricle

6. Left pulmonary veins
7. "Guy ropes" holding valve flaps. These prevent the valve from giving and being pushed into the cavity of the auricle when the ventricle contracts.



THE CIRCULATORY SYSTEM
See page 353.

Section I—Health

CHAPTER 1

Trials and Triumphs of Medicine

Since the days of Moses, the great lawgiver of Israel, the greatest leaders and benefactors of mankind have been maligned, misunderstood, stoned, and put to death. He who so meekly and patiently led his brethren out of Egyptian bondage was ever and anon greeted with the mournful wail: "Because there were no graves in Egypt, hast thou taken us away to die in the wilderness? . . . Would God that we had died in the land of Egypt!" The prophet Jeremiah was cast into a miry dungeon; Daniel was subjected to the ordeal of the lions' den; and Christ, the blessed Redeemer of mankind, was mocked and spit upon and scourged and crucified between two of earth's malefactors.

The same virulent hatred of those who have come with the greatest blessings marks the pathway of medicine. In a word, the history of medical science is the history of a little group of great souls, fighting single-handed against every kind of odds, to establish truth and to abolish error. Save for Hippocrates, Galen, Vesalius, Harvey, Virchow, Leeuwenhoek, Jenner, Pasteur, Ronald Ross, Semmelweis, Lord Lister, Walter Reed, and a few others, how terrible would be the sufferings and agonies of the world to-day! Yet each of these in his turn was ridiculed and vilified, and the rich benefactions they brought to men and women were declared to be worse than naught. The story is the same even amid the blazing light of the twentieth century.

SMALLPOX

Smallpox, prior to the days of Edward Jenner, was by far the most dreaded of all the ministers of death. "The plague" made swift havoc, but its visits were few and far between. On the other hand, smallpox, like the poor, was ever with mankind. It filled the churchyards with horrible, disfigured corpses; it depopulated cities, and exterminated nations. In Europe alone, it claimed hundreds of thousands yearly. The death rate there was about 2,000 per million. In London, during the third quarter of the seventeenth century, the annual mortality was over 4,000 per million, and later rose to about 5,000

per million. In the one lone year of 1796, 30,000 of the inhabitants of Prussia were carried off by smallpox. Approximately the same number were annually laid low by its hand in France. In 1707, smallpox visited Iceland, taking a toll of 18,000 out of a population of 50,000 souls. "In regions as widely separated



Edward Jenner Vaccinating His Son

as Brazil and Kamchatka, whole races of men became extinct through the fearful fatality of this disease." Annually every seventh child born in Russia died of smallpox. Bernoulli tells us that each twenty-five years, it snuffed out the lives of no less than 15,000,000 men, women, and children. In the eighteenth century, it sent at least 60,000,000 souls to their graves. Only

a small percentage of earth's inhabitants escaped its ravages. So general was this disease that there was a popular adage current since mediæval days: "From smallpox and love but few remain free."

Not only did this fearful scourge destroy life, disfigure and maim, but it was also a most potent cause of blindness. The early records of the London Asylum for the Indigent Blind show that two thirds of the inmates had lost their sight through smallpox. (Blane, Sir Gilbert; Med. Chir. Tr. X, 326.) Truly has Macaulay written, "It left on those whose lives it spared the hideous traces of its power, turning the babe into a changeling at which the mother shuddered, and making the eyes and cheeks of the betrothed maiden objects of horror to the lover."

"In those stricken days," says Victor Robinson, "if a messenger had come from heaven, and standing on earth's highest hill, had declared to all mortals, 'From the long roll of human evils, I shall remove one disease: which shall it be?'—one universal voice would have answered in answer, the desire of kings blending with the prayer of peasants, the cultured accents of the scholar mingling with the cry of the man of the streets: 'Smallpox.'"

Then the conquering hero came, a humble country doctor, dressed in blue coat with brass buttons, buckskins, jockey boots, and silver spurs. Small and dapper came this son of a Gloucestershire clergyman. From among the army of medical warriors of his time, he marches forth like David, the son of Jesse, with his sling and stone, to conquer the Philistine, Goliath of Gath. This David came with only a tiny bit of virus on the tip of an ivory lancet, with which to slaughter earth's most hideous monster.

How well he succeeded is shown by the figures. In well vaccinated Germany, approximately but one person a year in every million of population dies of smallpox. About the same figures hold true for Denmark, Norway, and Sweden. In England, where vaccination is not practiced to nearly such an extent, but where nevertheless it is much in vogue, only an average of twenty persons per million died of smallpox each year between 1893 and 1897. In Prussia, where compulsory vaccination is thoroughly carried out, the total deaths in one year from smallpox were only four in a population of 16,000,000. Between the years 1874 and 1896, there was but one death from smallpox in the whole German army. In Ireland and Scotland, the death rate has been reduced to about four or five per million. Figures

might be multiplied from all over the world, but this is unnecessary. To-day we rarely ever see in our own fair land a person whose skin is pitted and poeked from this dread disease. We fear it less than influenza.

Yet, Edward Jenner's great discovery did not find its place in preventive medicine without a bitter fight. A minister of the gospel declared that the practice was contemporaneous with the Old Testament, and that Job's boils were due to the fact that he had been vaccinated by the devil. Another divine assured his parishioners that God had sent smallpox into the world because Adam and Eve had shown a predilection for forbidden fruit. William Rowley published a pamphlet entitled, "Cowpox Inoculation No Security Against Smallpox Infection, to Which Are Added the Modes of Treating the Beastly New Diseases Produced from Cowpox." And this same Rowley exhibited a boy with a swollen face, and thus explained the ease:

"On this cheek, you can perceive a protuberance arising like a sprouting horn; another corresponding one will shortly spring up on the other side; for this boy is gradually losing human lineaments, and his countenance is transmuting into the visage of a cow." (Cited by Robinson, "Pathfinders in Medicine," pages 209, 210.)

Macfie refers to one antivaccinator who exclaimed that the "vaccine was the most accursed thing ever proposed; he wished the inventors were all hanged, and he would give his vote for this being done." Another declared that vaccination was "the most degrading relapse of philosophy that ever disgraced the civilized world." Still another exclaimed, "Who would marry into any family at the risk of their offspring having filthy, beastly diseases?"

But smallpox was such a terrible, such a real, ever present scourge in those days, that the propaganda of the antivaccination agitators did not meet with much success. From Greenland's icy mountains to India's coral strand, Edward Jenner was proclaimed a savior of mankind. From the wilds of Upper Canada, the grateful Indians of the Five Nations sent him a most touching tribute of their gratitude. The British Parliament granted Jenner an award of £10,000. He was honored by the king of Spain and the emperor of France. The empress of Russia wrote him a letter accompanying a gift of a ring studded with diamonds. She ordained that the first child vaccinated in Russia should be named Vaccinoff, and that he should be educated out of the imperial treasury. When war existed between England and France, Edward Jenner petitioned for the release of some British prisoners. Napoleon refused the request until Josephine

told him that Jenner was the petitioner. "Ah," said Napoleon, "we can refuse nothing to that man."

Well has Victor Robinson said: "Men far greater than Jenner have done far less for human happiness than he. Jenner made the most dreaded of maladies the least feared."

SURGERY, OLD AND NEW

Thanks to the conditions under which surgery of the present hour is practiced, thousands of patients are operated upon every year without fear, and with a percentage of fatality so small that the low level of the surgical death rate is one of the most marvelous things in the world to-day. In fact, when one considers the danger to life and limb of our twentieth century existence, a well ordered operating room may be ranked as one of the safest isles of safety in the world.

It was not ever thus. In the memory of men yet living, the horrors of the pre-antiseptic days are still a terrible nightmare. Then every surgical operation was followed by inflammation and suppuration—that is, the discharge of "pus," or "matter." Sterilization and antisepsis were entirely unknown. The surgeon performed his task with hands washed as any gentleman might wash his hands. He commonly wore an

old frock coat, ornamented with dried blood spots from occasions of similar kind. His instruments were taken from "a velvet-lined case," and were no cleaner than the cutlery and silverware on a family dining table, if as clean. There was no previous cleansing of the patient's skin. If a scalpel fell upon the floor, it was picked up by surgically dirty hands, rinsed in ordinary water, and plunged into the abdomen again. Sea sponges were used instead of gauze. They were washed in ordinary water, and did service over and over again. The blood vessels were tied with



A sixteenth century dentist extracting a tooth. Not so many years ago, before anaesthetics were known, dental as well as surgical work was a source of excruciating pain to the patient.

common silk sewing thread, one end being always allowed to hang out of the wound. The skin flaps were united by the use of an ordinary needle and thread. Within forty-eight hours, the patient would be tossing with a fever, which would run as high as 105° Fahrenheit. Then every few hours, a fresh but surgically dirty poultice would be put upon the wound to replace the old one now cold, foul, and ill smelling, and bathed with pus.

Dr. W. W. Keen, the Nestor of American surgery, has written:

"I have often seen the pus escaping by the tablespoonful and the wounds alive with squirming maggots resembling chestnut worms. By this time also it was hoped that the silk ligatures, with which the arteries had been tied, had literally 'rotted' loose, and each one of them was gently pulled on to the discomfort of the patient."—*William Keen, M. D., LL. D., "Animal Experimentation and Medical Progress," page 201.*

Sometimes, as in the case of the great Lord Nelson, the hero of the battle of Trafalgar, the ligatures did not rot away for years. During all this time, the wound had to be dressed on account of constant discharge. It often happened, "when the ligature and the rotten end of the artery were pulled off, there was no clot to act as a stopper." Then "secondary hemorrhage" followed. The fatality of such hemorrhage is evinced by the fact that in 2,235 cases of hemorrhage in the Civil War, 61.7% of the patients died. ("Medical and Surgical History of the War of the Rebellion," part 3, "Surgery" volume, page 819. Cited by Keen. *Ibid.*, page 202.)

Rarely did a patient, after an important operation, get well under three or four weeks; and many times, the period was lengthened to that many months.

During the days of the Civil War, wounds of the abdomen, especially bullet wounds, were among the most fatal injuries known to surgery. Out of 3,717 men suffering such wounds in battle, only 444 recovered.

Gangrene in various forms was rife, and often fatal. In 2,503 cases, 1,142 patients died, a mortality of 45.6%. Keen describes hospital gangrene in those sad days as frequent, and tells how "a simple flesh wound scarcely larger than the bullet which made it, became larger and larger till a hand would scarcely cover it and it would eat into the tissue until one could put half his fist into the sloughing cavity."

Turning from these sad sights, which nevertheless are the unvarnished facts of history, let us rest our eyes upon the other side of the shield,—surgery as surgery is to-day,—and let us pause a moment to study the manner in which the wonderful

transformation has been achieved. I cannot forbear quoting again the rapturous description of the happy change, as given by the venerable Keen:

"The results of the establishment of the antiseptic method have been so extraordinary as to be incredible were it not for ample testimony the world over.

"At present, before an operation is begun, the patient's skin, the surgeons' and the nurses' hands, are scrupulously disinfected, sterile gloves are usually worn, and every person is clothed in a disinfected gown. The instruments, dressings, ligatures, everything that is to come in contact with the wound, is carefully disinfected. Disinfected gauze 'sponges' are used once and then discarded.

"It is almost impossible for anyone not a surgeon to understand how different are the results from this radical change of methods. No change of climate from fierce midwinter storms to lovely summer breezes or autumn golden harvest could be greater. Most wounds now heal within a few days, often, one might almost say, without the patient's being sick. Compound fractures and opened joints heal as if there had been no break in the skin. Arteries can be tied anywhere without fear of secondary hemorrhage. The abdomen is now fearlessly opened."—*Dr. William Keen, "Animal Experimentation and Medical Progress," page 214.*

At the present time, operations upon the human abdomen are performed by the thousands with an almost negligible death rate. Yet it was only a few years ago that such operations were almost entirely unknown. Then an abdominal wound was veritably certain death. In 1884, a Chicago surgeon named Parks made a series of stomach experiments on thirty-seven dogs. The dogs were placed under the influence of ether, then shot, and the abdomen opened, and the wounds of the intestines, arteries, mesentery, *et cetera*, thus produced, were treated by appropriate surgical methods. It was in this way that surgeons learned how to perform abdominal operations, even to removing pieces of bowel and uniting the cut ends. It was in this way that men learned that the spleen could be removed, that a portion of the stomach could be cut out because of cancer, that a part of the bladder could be dissected away, that the entire gall bladder could be removed. All these operations, which are now performed over and over again in the most successful manner, have been learned by experiments upon the lower animals.

Having lost four cases of ovariectomy, Sir Spencer Wells, on making a post-mortem examination, was led to believe that the treatment of the peritoneum of those days was incorrect. He

believed that he ought to bring its surface in contact in order to obtain proper union. Very wisely indeed, instead of testing his ideas upon women, he experimented upon a few dogs, and found that his suspicions were correct. Was it cruel to take the lives of a few dogs in order to save the lives of hundreds and thousands of women?

I have previously referred to the ligatures of the olden days. Philip Syng Physick endeavored to get rid of dangers following the use of silk by using buckskin, on the ground that it was an animal substance and would be absorbed. Eve and Bellinger used the tendon of a deer. Dorsey used catgut, and Hartshorne used parchment cut in fine threads. But none of these men succeeded in giving us harmless ligatures until the great Lister taught us how to use them.

In 1867, Lister tied the great carotid artery in a horse's neck with a piece of pure silk, having previously saturated the silk in a strong solution of carbolic acid. He cut both ends of the thread short, and dressed the wound with antiseptic dressings. To his great delight, healing took place without any inflammation whatsoever. About four weeks afterwards he opened the horse's neck and made an investigation. He satisfied himself that if the thread had not been applied with antiseptic precautions, secondary hemorrhage would have occurred and the horse would have bled to death. Having tried out his plan upon a horse with such excellent results, he tried it in January, 1868, upon a woman who had a badly dilated aneurysmal sac in the upper part of the artery supplying her thigh and leg. She, like the horse, recovered without inflammation. In December, 1898, Lister used catgut on the carotid artery in the neck of a calf, having previously prepared it in the same manner as he had prepared the silk. The calf made a perfect recovery. Thirty days later the calf was killed and dissection made, and it was found that where the thread of catgut had been, there was a band of tissue surrounding the thread and closing the artery, and that instead of the thread's rotting through, it had become a part and parcel of the tissues, the artery being stronger there than at other points. The ligature and the knot had altogether disappeared.

Neither the horse nor the calf suffered any material pain; and by means of these experiments, the wretched old-time methods of ligating arteries and sewing wounds were brought to an end, and a new era in surgery, greatly to the comfort and blessing of the human race, was ushered in.

The changes wrought by these discoveries were well illustrated by conditions in the Munich General Hospital. In 1874, blood

poisoning and hospital gangrene were occurring in 80% of all wounds in the hospital, whether accidental or inflicted by the surgeon. Early in 1875, antiseptic treatment was introduced by Nussbaum. From then on until Lister's visit, sometime in the summer, not a single case of hospital gangrene had occurred, and only one case of blood poisoning, and that a doubtful one.

VENEREAL DISEASES

Glance for a moment at the history of the treatment of syphilis. Here is a case where "clinical observation," which was

glibly proclaimed by the opposers of animal experimentation as the only true method for the study of disease, utterly failed. It will be clear that in the case of this malady, no experiments on human beings could come within the realm of contemplation. It was not until 1903 that Metchnikoff first succeeded in inoculating the disease in apes and later in other animals. In 1905, by means of their experiments on animals, the germ was discovered by Schaudinn and Hoffmann. In 1910, "after a most extraordinary series of experiments with 605 other remedies, which had to be discarded as ineffective or too dangerous, Ehrlich discovered



The Creator of Salvarsan, Professor Paul Ehrlich, with Dr. Kato, Suggester of the Preparation

his salvarsan, or '606.'" Since that time, the medical profession has been able, to an extent previously undreamed of, to combat this most tragic of all devastating plagues. For in the case of its ravages, many of its victims are innocent women; helpless infants, some even dead when born; others in the tenderness of a kindly Providence blessed with an early grave; and still others less fortunate, fated to linger for years, hideous specimens of the power of this sad malady in which the sins of the fathers are so manifestly visited upon the children.

For long centuries, in spite of "clinical observation," this dire disease had been visited upon both guilty and innocent, and "clinical observation" had yielded no harvest of cures. In

seven short years, by experiments upon animals, the power of the dragon was broken. Antivivisectionists may hurl their anathemas at Metchnikoff, Ehrlich, and others for their methods of vivisection, but thousands of innocent women and children will rise to call these great benefactors of the human family blessed indeed.

LOCKJAW

For many years, it had been believed that tetanus, commonly known as lockjaw, came from treading on a rusty nail. In 1884, Nicolaier made a number of experiments on mice, guinea pigs, and rabbits, and learned that lockjaw is caused by a specific germ that is found in the soil, especially in that around stables and other places frequented by horses. There is, of course, a certain amount of truth in the old theory that the terrible disease comes from treading on a rusty nail; but this is not because it is a nail or rusty, but because the nail has become infected with the lockjaw germ. The little germ looks somewhat like a tiny tack. So deadly is it that its poison in doses of 1/200,000th of a teaspoonful will kill a mouse. When, by these experiments on animals, the germ and its poison were learned, an antidote or antitoxin was soon developed; and to-day lockjaw is almost unknown except after wounds that have been neglected, instead of occurring with terrible frequency, as in former years.

And here it must be remembered that animals have benefited by this discovery as much as men, or more; for horses suffered of lockjaw more than their caretakers. The same antitoxin is used on the one as the other. Were the experiments on a few mice and rabbits and guinea pigs worth while, or should untold suffering have been perpetuated upon the human family, and upon the horse, man's most faithful helper?

DIPHTHERIA

Take the case of diphtheria, that dread disease which took the lives of so many young children especially. Formerly from sixty to eighty or ninety per cent of those attacked, say an average of seventy, succumbed. To-day the average death rate is from five to eight per cent. How was this brought about? In the year 1890, Kitasato, a Japanese scientist, working with Von Behring, a noted German investigator, thought that if the serum of an animal which had recovered from diphtheria were injected under the skin of an animal which had not had diphtheria, this latter animal would become invulnerable, or as it is commonly called, immune, to the diphtheria poison. From this simple beginning, the method of preparation of the antidiphtheritic serum was perfected. The diphtheria bacilli are grown in special beef

teas; and when they have multiplied by millions, they are filtered off, and a highly poisonous fluid filled with their toxins is left. This bouillon is then injected in measured doses into a horse, each dose being just a little larger than the previous one. The final result is that the blood of the horse becomes filled with anti-toxins ready for injection into human beings. A tube is then



International

From the horse, we get the antidiphtheritic serum that has cut so greatly the death rate from diphtheria.

inserted into the jugular vein of the horse, and the blood is drawn off, and the serum used as a preventive measure, or injected into those already suffering of diphtheria.

The fangs of the serpent diphtheria have been drawn. No longer is it the deadly menace that it was in days gone by. A child stricken with the dread disease may be, within a few days after the administration of the serum, restored to perfect health. All this knowledge and the resultant saving of human lives have been made possible by experiments on animals and by the use of horses as a source of the protective serum.

MENINGITIS

Another fearful fate of humankind was epidemic cerebro-spinal meningitis. Formerly the mortality from this disease ran from sixty to even ninety per cent. To-day it is less than twenty-five per cent.

Dr. W. W. Keen, of Philadelphia, to whose writings I have referred several times previously in this chapter, contrasts most touchingly two cases of cerebrospinal meningitis. He tells that, in 1905, a certain physician was to assist him at an operation on a Thursday morning; but on Wednesday, this physician telephoned Dr. Keen, stating he was not very well, and advised that some one else be engaged to take his place. At ten o'clock that night, Dr. Keen was called to the bedside of this doctor, who was already unconscious. Dr. Keen refers to his feelings by saying, "As I sat beside him and his weeping young wife, who expected to become a mother, how I longed for some means by which the hand of death could be stayed! But he died in less than thirty-six hours from the time that he was seized with epidemic cerebrospinal meningitis."

The other case to which Dr. Keen refers is that of Charles E. Hughes, Junior, son of Secretary of State Hughes. On June 16, 1909, young Hughes was graduated with his class at Brown University. Only a few weeks before that, he had been seized with a violent attack of this same epidemic cerebrospinal meningitis. Tests showed that the fluid in his spinal canal contained a large amount of pus. No medical man familiar with the disease would have thought that he could possibly recover. But in 1907, midway between the death of the doctor referred to and this case, Drs. Flexner and Jobling, of the Rockefeller Institute, had discovered by researches on animals alone a serum against this disease. Three doses were administered to young Hughes. Within twenty-four hours after the first dose, his temperature became normal. The pus disappeared after the second dose, and he soon recovered.

In discovering this serum, Dr. Flexner had experimented on twenty-five monkeys and one hundred guinea pigs. Many of these animals themselves were cured by the use of the serum. Having found it effective on animals, he proceeded to use it on human beings, with the result that instead of a death rate of from seventy-five to ninety out of one hundred patients, the death rate has dropped to thirty, twenty, ten, and even to seven in the hundred. Commenting on this, Dr. Keen writes as follows:

"Let me now put a plain, straightforward, common-sense question. Which was the more cruel: Dr. Flexner and his assistants who operated on twenty-five monkeys and one hundred guinea pigs, with the pure and holy purpose of finding an antidote to a deadly disease, and with the result of saving hundreds, and, in the future, thousands on thousands of human lives; or the women who were 'fanned into fury' in their opposition to

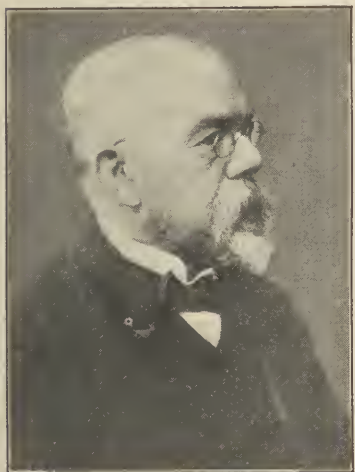
all experiments on living animals at the Rockefeller Institute, 'no matter how great the anticipated benefit'?

"If these misguided women had had their way, they would have nailed up the doors of the Rockefeller Institute, would have prevented these experiments on one hundred and twenty-five animals, and by doing so, would have ruthlessly condemned to death for all future time five hundred human beings in every one thousand attacked by cerebrospinal meningitis!"

TUBERCULOSIS

And what shall I more say? For the time would fail me to tell of Koch, who in 1882 isolated the germ of tuberculosis, and in so doing brought from ambush the most deadly machine gun

in all the armamentarium of death. In comparison with this wee weapon of the grave, Browning, Gatling, and Lewis rapid firers are mere tyros in the art of destruction. Long had the bacillus tuberculosis sat upon his throne—the bacterial Beelzebub of the Lilliputian host. Acting through the mouths of coughing consumptives, this prince of the power of the air has invaded the bodies of millions of human beings, and sent them by companies, battalions, and regiments to their long rest in green churchyards. Cunningly has he concealed himself in the milk upon which the helpless babe depends for its nourishment, and thus entering its frail form, has



International
Dr. Robert Koch, the Discoverer of the
Germ That Causes Tuberculosis

nested there till some dire day when the vital forces of his little host were ebbing low. Then he has stalked forth to prey upon the one who had given him shelter, and to enter upon his active campaign.

But Koch got him in his lair, chained him to the chariot wheels of his microscope, studied him in all his devious ways, and led him forth in a greater triumph than ever Roman Cæsar led his captives on the Appian Way.

As a result of the work of the scientific Koch, the saintly Trudeau of Saranac, and others, thousands upon thousands of lives have been spared for long years of usefulness. Bread-

winners who would otherwise have been snatched from their homes and hearths have remained to bless and provide for wife and child committed to their care. Year by year, the toll of this grim reaper lessened, and fervent hearts rejoice because of lengthened days wherein to labor and to love.

Yet, because the ultimate test often necessary to determine whether or not a person is afflicted with tuberculosis involves the life of a guinea pig, there are those who would put forth every effort to secure legislation to prevent such a use of this little animal. A poor mother may be trembling with anxiety, not knowing for certain whether her ailment is tuberculosis or some much less terrible and merely transient disease. The test above referred to is the one positive means by which the question can be absolutely determined. Think of all that is involved in the life of that anxious soul. Without the test, safety to her family would demand that to a large degree, if not absolutely, she separate herself from the tender children who so sadly need her care. But with the test made, and proving negative, she may safely remain to bless and care for the little ones dearer to her heart than life itself. Of how much more value is the happiness of this home and mother than the life of many guinea pigs!

MALARIA

Or shall I write of the parasite of malaria, a tiny animalcule and a terrible murderer? For thousands of years, he sallied forth from marsh and pool in his mosquito *aéroplane* to fill the earth with sickly, anæmic, and cachectic men, women, and children, whose sweats and chills, and shivering and fevers, made their lives a living death.

In all of our Southern States, throughout the lowlands of the Italian peninsula, on the historic soil of Greece, from the forests of Michigan to the jungles of India, the terrible *Anopheles* mosquito and the parasitic warrior who rode within him, waged war against mankind, and left wreck and ruin in their wake as verily as did Alaric the Visigoth, or Attila the Hun. And when France undertook to build the Panama Canal, malaria forced that proud people to lower their tricolor and abandon the task.

It was not until 1880 that Laveran discovered the parasite of malaria. This discovery was one of the greatest gifts the laboratory has ever bestowed upon mankind. But while Laveran discovered the criminal in the blood of men and women, scientists were still in darkness as to how he got there. Was he drawn into the nostrils by respiration or ingested in the food?

To Surgeon Major Ronald Ross of the British Army Medical Corps belongs the blessed honor of solving this problem, fraught

with such a happy destiny for mankind. After many weary months of study and experiment, this soldier physician demonstrated, on the far-away plains of India, that one and only one genus of the mosquito known as the *Anopheles* imbibes the protozoan of malaria from the blood of persons already infected. In the intestine of the mosquito, the parasite dwells for a season, uniting with another of his kind, with whose assistance a family is brought forth in the body of the mosquito. These offspring in turn make their way to the salivary gland of the mosquito; and next, when the mosquito bites a human being, an infection of the parasite is made beneath the skin, as verily as ever a physician makes an injection with a hypodermic syringe. Every phase of the life story of this murderous pest has been brought to light, "all the events in its checkered and adventurous career, from its marriage in the intestine of the mosquito to the setting free of its spores in the blood of man, have been carefully demonstrated."

To accomplish all of this, to break the malarial yoke, long days and weary nights worked Ronald Ross. On, on he toiled, to use the words of the great apostle, "in much patience, in afflictions, in necessities, in distresses, . . . as unknown, and yet well known; . . . as sorrowful, yet always rejoicing; as poor, yet making many rich." And when at last the final experiment was made, when the hidden works of darkness were brought to light, and when the womb of mystery delivered up her secret, this gentle man of medicine fell upon his knees and humbly offered his grateful praise to the God who had so graciously heard his supplication and "placed within my hand" that knowledge which "a myriad men will save."

This day relenting God
Hath placed within my hand
A wondrous thing; and God
Be praised. At His command,

Seeking His secret deeds,
With tears, and toiling breath,
I find thy cunning seeds,
O million-murdering death.

I know this little thing
A myriad men will save.
O Death, where is thy sting?
Thy victory, O Grave?

But how did Ronald Ross investigate the process of this infection? He did it by inoculating healthy birds by the bite of infected mosquitoes. Later, in order to make his deductions

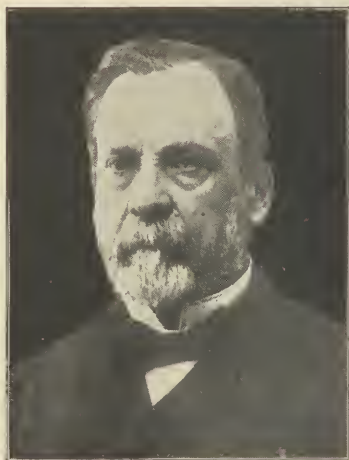
sure beyond all doubt, experiments were made on man. For instance, in the year 1900, a collaborator, Dr. Patrick Manson, who was afterward knighted by the crown as a reward for his great service to the country, had shipments of live infected mosquitoes sent to England. These were permitted to bite his son, Dr. Thurburn Manson, who, prior to this time, had never had malaria. He soon developed the disease, and parasites were demonstrated in his blood. So it was that these brave men were just as willing, when occasion required it, to experiment upon themselves as upon birds.

Yet Ross and Manson have been abused and vilified as cruel malefactors because of experiments on the birds, even though these experiments brought to mankind the priceless knowledge of how malaria was transmitted, and how it could be controlled.

THE WORK OF PASTEUR

As the omega of this chapter, a few words must be said concerning the great Louis Pasteur, of merited renown. To him we owe our knowledge of the true nature of the process of fermentation; to him we are indebted for our understanding of the chief maladies which have wrought death and devastation among both men and animals; and lastly, he it was who gave us the light on how our bodies may be protected against these ills, or their toxins rendered innocuous when once within the citadels of our beings.

Sir William Osler has truthfully said that during the nineteenth century, we learned to "trust nature more, and drugs less; we got rid [in part] of treatment by theory, and we cease to have a drug for every symptom. . . . At the middle of the last century, we did not know much more of the actual causes of the great scourges of the race, the plagues, the fevers, and the pestilences, than did the Greeks. Here comes in Pasteur's great work. Before him, Egyptian darkness; with his advent, a light that brightens more and more as the years give us a fuller knowledge." Some one has remarked that we owe our bacteriology to beer, for it was a series of studies on the diseases of beer, and the mode of



International
Louis Pasteur, the Discoverer of a Cure
for Hydrophobia

the production of vinegar, which convinced Pasteur that he had the key to the nature of the infectious diseases.

Sad to relate, Louis Pasteur was stricken with paralysis in his forty-sixth year. Yet, contrary to all expectations, he recovered; and although his health was shattered to a considerable degree, he devoted himself so ardently to his researches, that his greatest discoveries were achieved after the calamity had befallen him.

In 1877, that terrible disease known as *anthrax* was taking a fearful toll of the sheep of France. In some flocks, the death rate reached as high as fifty per cent. Horses, oxen, and cows also succumbed to this mysterious scourge. Man was by no means exempt. Then it was that Pasteur began his endeavors to solve the mystery.

About this time, a great discussion started in medical and scientific circles, upon the subject of the origin of typhoid fever. Many of the medical men of the day attacked the germ theory, proclaiming the spontaneity of living organism. Louis Pasteur met their attack by means of the most careful and precise experimental methods.

It is difficult, now that the germ doctrine has become so thoroughly established, to place ourselves back in the days when only a handful of men were courageous enough to believe it. Pasteur was the leader of this little group, and the most active exponent of the principle of germ infection.

At this time also, there was intense discussion relative to the cause of puerperal fever. Women were dying in childbirth by the thousands, and physicians had been unable to discover the basic cause.

"Pasteur," wrote M. Roux, "does not hesitate to declare that that microscopic organism is the most frequent cause of infection in recently delivered women. One day, in a discussion on puerperal fever at the academy, one of his most weighty colleagues was eloquently enlarging upon the causes of epidemics in lying-in hospitals; Pasteur interrupted him from his place. 'None of those things cause the epidemic; it is the nursing and medical staff that carry the microbe from an infected woman to a healthy one.' And as the orator replied that he feared that microbe would never be found, Pasteur went to the blackboard and drew a diagram of the chainlike organism, saying, 'There, that is what it is like!' His conviction was so deep that he could not help expressing it forcibly. It would be impossible now to picture the state of surprise and stupefaction into which he would send the students and doctors in hospitals, when, with an assurance and simplicity almost disconcerting in a man who was entering a lying-in ward for the first time, he criticized the appliances,

and declared that all the linen should be put into the sterilizing stove.”—*“The Life of Pasteur,” by René Vallery-Radot, page 291.*

Pasteur finally brought forward a vaccine of the anthrax bacillus with which to combat anthrax. The story of this triumph reads like a romance. The controversies which raged between Pasteur and the French veterinaries remind one of the dueling days of the Middle Ages. But Pasteur proved his doctrine at the Pouilly le Fort farm, and the sheep and cattle of France and the world were saved.

But the greatest triumph of all came with the discovery of a cure for hydrophobia—the mystery of the ages. From the gray dawn of time, this awful malady had been as a hideous nightmare to mankind. One of Homer’s warriors had called Hector a mad dog. Celsus had told how the patient “is tortured at the same time by thirst and by an invincible repulsion toward water,” and he advised cauterization with a hot iron. By making an emulsion of the brain of a rabid dog, and with it inoculating the brain of a healthy dog, Pasteur succeeded in transferring the disease to the healthy animal. He found that the poison could be cultivated in the brains of living rabbits, and as it was transferred from brain to brain, it became more virulent. And again he learned that if the nerve tissue was dried, the poison gradually lost its virulence. Later he proved that an animal could be vaccinated and rendered immune to rabies.

Since childhood, Pasteur had possessed a deep longing to find a cure for hydrophobia. When he was only a child, a rabid wolf had appeared in the community where he lived. Many of his friends and neighbors had been bitten; and for years, the district lived in terror of this wolf.

One of the most touching incidents in the life of Pasteur occurred in July, 1885, when he made his first experiment for the cure of hydrophobia in a human being. A little Alsatian lad had been terribly bitten by a mad dog. Pasteur’s heart was greatly touched, but he feared lest his experiments had not progressed far enough to warrant his treating a human being. He realized, however, that the only chance the child had was for him to act. The agonies through which Pasteur passed, fearing that the treatment might not be a success, are almost indescribable; and his joy when he knew at last that a cure had been accomplished, was beyond words to express.

And since that time, Pasteur’s cure for hydrophobia has spread all over the earth, and thousands have been blessed by its ministrations. The death rate now from this dread disease, compared with what it was in days of old, is a negligible quantity.

CHAPTER 2

The Body's Defensive Mechanism

In these days of pestilences, epidemics, and other disease offensives, it is futile to attempt to escape ill health by dodging microbes. Eighty to ninety per cent of healthy people constantly harbor the germs of pneumonia in the mouth and the throat. Fully ninety per cent of children become infected with the germs of tuberculosis before reaching the twelfth year of life, but a relatively small portion develop the disease. In the recent influenza scourge, the epidemic found its way to the remote mountain hamlet, to the lonely sheep herder's camp, and to the isolated lighthouse station — places far removed from the thoroughfares of travel. To dodge it would have meant to get off the earth. Obviously, too, we cannot sterilize the whole world. Resistance to disease depends upon physical fitness. It is a question of blood. It means that the natural defenses of the body against disease invasion must be kept adequate. To these lines of body defense we now direct our attention.

THE FIRST LINE OF DEFENSE — GENERAL SANITATION

While it is true that the causes of disease are often so widespread that they cannot be avoided, and that an attack of illness may sometimes be prevented only by strengthening the natural resisting powers of the body, yet no one would think of needlessly exposing himself to avoidable danger. Much can be done to prevent and avoid the assaults of disease upon the body.

Contagious cases may be isolated, and their excreta, linen, *et cetera*, carefully disinfected. The premises can be kept sweet and clean, and proper disposal made of sewage and garbage.

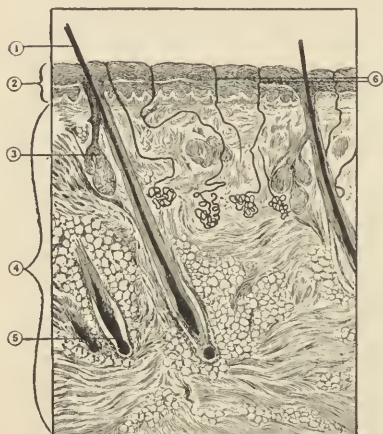
The disease-laden fly and the malaria-bearing mosquito can be excluded from our homes, and their breeding places destroyed.

We can insist upon an uncontaminated water supply, and can complete the work of banishing the public drinking cup. We can thoroughly sterilize our milk, and thus reduce the danger from this source.

We can ventilate our workshops, our homes, and our lungs, and can breathe through the nose rather than the mouth, so that the air may be properly filtered, moistened, and warmed, and any poisonous gases detected.

THE SECOND LINE OF DEFENSE — THE SKIN AND THE MUCOUS MEMBRANES

It is significant that at every possible portal of entry of disease germs into the body, there stands a sentinel on guard ready to dispute the intruder's right to advance. There is not a disease germ known to science which can pass the barrier of a healthy skin. Remarkable in structure and beautiful in design, the skin forms a protective wall, six strata of living cells in thickness,



Section of Skin Highly Magnified

1. Hair
2. Epidermis
3. Sebaceous or Oil Gland, and Its Duct
4. True Skin
5. Roots of Hair
6. Sweat Glands

which separates the life current (the blood), and the delicate tissues and organs within the body, from a host of dangers without.

The skin not only covers the outer surface of the body, but modified in form, it lines the cavities of the nose, the mouth, the throat, and all the internal passageways. This internal skin is called "mucous membrane." The external skin pours out upon its surface an oily secretion to keep it soft and pliable, also a large quantity of sweat, or perspiration. The internal skin also secretes various fluids, or juices, some of which are important factors in the body's defensive mechanism. In the nose, the secretion not only keeps the surfaces moist, causing the lodgment of

dust particles — the *aëroplanes* upon which disease germs ride — but also exercises a bactericidal or germ-destroying power. The nose, being located as it is, just above the main gateway to the body, fills the further protective office of guard over the mouth. This service is rendered by the sense of smell, or olfaction, which is perhaps the most delicate of all the senses, and has been called "tasting at a distance."

The saliva within the mouth makes possible the work of the taste buds, which sometimes detect injurious substances about to enter the stomach, and thus it becomes the medium of their rejection. The saliva tends also to dilute any caustics, such as strong acids or alkalis, that may gain entrance to the mouth, and by its content of mucus, protects the lining mucous membrane.

The trachea, or windpipe, and the bronchi are lined by a type of little cells whose structure and work are truly marvelous. They are in shape like tiny columns arranged side by side, and closely packed together. Upon the free end of each cell there is a little tuft of hairlike projections called cilia. The resemblance of these cells to little columns, and the presence of the cilia, has given to them the name "ciliated columnar epithelium." The cilia keep up a constant whiplike motion outward, the effect of which is to remove dust, bacteria, and other foreign particles, preventing their entrance into the lungs.

Contaminated water and infected milk and food are frequently the source of disease, such as typhoid fever, cholera, diphtheria, *et cetera*. The gastric juice secreted by a healthy stomach contains a free mineral acid. This hydrochloric acid is an efficient disinfectant. Even water, which requires no digestion, stimulates a copious flow of this acid. Healthy gastric juice, it is said, will destroy the germs of cholera in thirty minutes. The bile and the intestinal juice are also mildly antiseptic.

Scattered over the whole of the inner surface of the small intestine, and to a lesser degree within the stomach, are myriads of little nodules of lymphoid tissue known as the solitary glands. In the terminal portion of the small intestine, aggregations of these solitary glands form larger areas called Peyer's patches. These solitary glands and Peyer's patches consist mainly of collections of one type of white blood cells, and doubtless aid in preventing the passage of disease organisms through the wall of the digestive tube.

The skin performs an added protective function in the regulation of body temperature. Good health requires that the temperature of the body shall vary only within certain narrow limits. Prolonged high or low temperatures embarrass the heart's action, unbalance the circulation, and lower bodily resistance. The normal temperature as registered in the mouth is 98.6° F. If the temperatures of two healthy persons were recorded, and one should be sent to the coldest region of the frigid north, the other to the hottest section of the torrid south, under conditions of suitable clothing, their body temperatures would differ less than two degrees Fahrenheit, although there might be a difference of two hundred degrees in the atmosphere of the two regions. This marvelous automatic protective adaptation of the body to extremes of temperature variations is governed by the nervous system through changes in the circulation of the blood within the skin.

Associated with the skin, and developing from it, are other structures called the appendages of the skin. These are the hair, the eyebrows, the eyelashes, and the nails. Their chief function is also one of protection. The eyebrows and the eyelashes prevent the entrance of sweat, dust, and other foreign particles into the eye. The little tuft of hairs at the entrance to the nostrils acts as a filter to the air breathed. The hair distributed over nearly the whole body surface affords protection against blows, aids in touch sensation, and by its association with the oil glands of the skin, helps to conserve body heat.

THE THIRD LINE OF DEFENSE — THE LYMPH GLANDS AND THE TONSILS

Should an invading army of microorganisms succeed in breaking through the second line of body defense, it would encounter a more formidable resistance at the third line. This third defensive mechanism consists of a double line of glandular forts interposed between the skin and mucous membranes and the blood stream. These little bodies, numbering many hundreds, are called the lymph nodes, or lymph glands. (See chapter 36.) Because of similar structure and function, the tonsils and other lymphoid tissue should be included.

These lymph glands consist of aggregations of lymphocytes, a type of white blood cell, held together by a delicate supporting tissue. Through them the lymph must circulate in its passage to the blood stream. Within them white blood cells are made, and the lymph is purified. They assist in destroying disease germs and in neutralizing their toxins. They have a double arrangement near the body surface and about the internal organs, being grouped into superficial and deep sets. Because of this arrangement, lymph from any region must pass through at least two sets of these protective glands before entering the blood.

Everyone is familiar with the swelling of the glands of the neck which occurs with sore throat, or a wound or carbuncle about the head; also with the swelling and tenderness of the glands in the armpit or the groin in cases of infection or abscess of the hand or foot. The same changes take place within the glands about the stomach, the intestines, the lungs, *et cetera*, when these organs become seriously diseased. There are twelve



A lymph node, showing channels leading to and from it. There are many hundreds of these in the body.

of these protective glands in the first superficial line surrounding the stomach, and about twenty in the second or deep set. The small intestine is favored with three distinct lines of these glandular forts, numbering about two hundred, in addition to the solitary glands and Peyer's patches, already mentioned. These glands increase in number and size from the primary or inner through the secondary to the tertiary or outer set.

Situated at the gateway for the entrance of food, drink, and air, are the tonsils and the lymphoid tissue covering the base of the tongue. In structure, these are very similar to the lymph nodes; and because of particular exposure, they are liable to disease, such as adenoids, tonsillitis, enlarged tonsils, *et cetera*. Their location, structure, and frequency of disease lead us to conclude that when normal they assist considerably in body defense.

THE LAST LINE OF DEFENSE — THE BLOOD

The longest and strongest line in the body's defensive mechanism is the blood.

It has been said that "a man is as old as his arteries;" and we may add that his health is just as good as his blood.

Every disease condition, whether a simple local injury or a general infection like typhoid fever, disturbs the blood, in its quality, its quantity, or its distribution. Therefore to have bad blood and good health is not possible; neither can one possess a perfect circulation of good, healthy blood, and at the same time be in ill health.

The blood in man comprises about one nineteenth of the body weight. It consists of a liquid portion, the blood plasma, within which float a vast number of little bodies, the blood corpuscles. The plasma forms about 60% of the blood volume, and the corpuscles about 40%. There are three main varieties of corpuscles,—the red cells, the white cells, or leucocytes, and the blood plates. Both plasma and corpuscles take an active part in the defense of the body. (See also chapters 34, 35.)

IMMUNITY

Immunity is the absence of susceptibility to disease. It may be inherited or acquired.

As is well known, the infectious diseases to which man is subject are not generally communicable to animals of lower species. Influenza, measles, and scarlet fever are examples. On the other hand, some of the infectious diseases that work havoc among lower animals, do not attack human beings; for example, hog or chicken cholera and rinderpest. It is said that when the

Russian cattle plague was killing hundreds of thousands of cattle in South Africa in 1897, not a single human being contracted the malady.

It is also known that certain races are particularly resistant to some contagious diseases, and others are peculiarly susceptible to the same. Negroes and American Indians are very susceptible to smallpox, and for them it is dangerous; while the Chinese either escape the malady entirely, or suffer less indisposition from it than do the white race. This inherited freedom from susceptibility to disease is called "natural immunity."

It is commonly understood that when a man has recovered from one attack of scarlet fever, measles, or smallpox, he probably will never have another, no matter how much he may be exposed to infection. This protection afforded by one attack of a contagious disease is called "acquired immunity."

About fifty years ago it was proved by Traube that if a bit of putrefying material was added to freshly shed blood, the blood would remain sweet. From this it was believed that the blood must possess germ-destroying power. But does this power reside in the liquid plasma, or in the blood corpuscles? To Metchnikoff, of Paris, belongs much of the credit for our present knowledge of the part played by the white blood corpuscles, or leucocytes, in destroying bacteria. Our understanding of the manner of their action may be improved by a brief study of the amœba. This tiny animalcule is a single-cell creature that is found in stagnant pools. It cannot be seen with the unaided eye, for it is only 1/100 inch in diameter. It consists of a little mass of clear, jellylike substance called protoplasm. Embedded within this mass is an oval body, which is the nucleus. This strange unicellular animalcule has the power to move about slowly. This



The Amœba

it does by putting out a false foot, or pseudopod, and then crawling into it. When it meets a solid particle suitable for food, it simply flows about it, inclosing it within itself.

The white blood cell is very similar to the amœba, except that the latter is twenty-five times as large. These white blood corpuscles, like the amœba, possess a nucleus, and can assume any shape.

They have an "amœboid" movement, and are not confined within the blood vessels. They can pass through the thinner-walled vessels, and may be found in any tissue or any fluid of the body. This property has given to them the name "wandering cells."

Their manner of attacking bacteria is identical with that by which the amœba takes its food. They engulf or swallow the bacteria that they meet, and the germs can be seen lying within the bodies of the leucocytes. Soon the germs become less distinct in outline, and later they disappear. Large numbers of bacteria that gain entrance to the blood stream are thus captured, imprisoned, and destroyed by the leucocytes.

Metchnikoff gave to these cells the name "phagocytes," which means devouring cells.

However, the outcome of the conflict between the phagocytes and the bacteria is not always so fortunate. Sometimes this line of defense has been weakened and battered down by health-destroying indulgences, or by previous ill health; or the number and virulence of the invading microorganisms may be such that the leucocytes are overwhelmed and the bacteria emerge from the combat victors.



White blood cells leaving the blood stream and entering tissues to fight disease germs. They are here seen engulfing bacteria. A triple row of red blood cells is shown in the center of the blood stream.

A remarkable fact about the phagocytes is the rapid increase of their numbers during acute infections. Within a few hours, the number of leucocytes in the circulating blood may double or treble. This increase in number is called "leucocytosis."

In some marvelous way, these leucocytes congregate where they are needed; that is, at the point of attack.

It has also been proved that there are within the blood plasma substances that aid the phagocytes in ingesting and destroying bacteria. These substances are designated "opsonins" (from *opsono*, "I prepare food for"), and in some way they sensitize or weaken the bacteria, so that they are more readily overcome by the phagocytes.

Of far greater importance than the phagocytes in the fortification of the body against the invasion of disease-producing bacteria, is the presence of certain chemical substances within the blood plasma. These substances possess the power either to destroy bacteria directly or to neutralize the toxins (poisons) they produce. These chemical substances are called "antibodies," "bacteriolysins," "antitoxins," *et cetera*. Some of these antibodies exist naturally within the blood plasma; others are produced by the body cells after infection has taken place. The

body responds to the stimulus afforded by the presence of the invading organisms or their toxins; and becoming aroused, it produces antitoxins, bacteriolysins, *et cetera*, which destroy the bacteria and neutralize their poisons. A few illustrations will help to make this point clear. If we inject at intervals into an animal such as the horse, very small but increasing doses of rattlesnake venom or cobra venom, we may after a time inject, without injury to the animal, a quantity that would at the first have been rapidly fatal. The horse has developed within its



Trans-Atlantic

Draining the poison from a lance-head snake

blood an "antivenom," which insures it against the poisonous effect of the venom. This can be proved by the fact that if some of the blood of the immunized horse be drawn and allowed to clot, the watery serum that separates from the clot will, if injected into another animal, protect it from an otherwise fatal dose of the venom.

Many lives have been saved by the timely injection of "antivenom serum" after persons had been bitten by venomous reptiles.

Diphtheria (see chapter 44) was known centuries before Christ. Aretus, in the first century A. D., wrote a clear description of the disease. Formerly the death rate was from 30% to 70% of those attacked. To-day the death rate is below 10%. The reasons may be summed up in a word—*antitoxin*.

Religion and Health

Health is a priceless treasure, valued most when lost. Of all temporal blessings, it is the most precious. Fame, education, position, money, are dearly purchased at the sacrifice of health. Without health, no other blessing can be so fully appreciated or so keenly enjoyed. Without it, a person cannot so readily comprehend or so efficiently discharge his obligations to himself, to his family, to the world, or to his Maker. Whatever injures the body not only lessens physical energy, but also weakens the mental and moral powers. Every unhealthful indulgence thus makes it more difficult to discriminate between right and wrong, and casts its weight into the scale on the side of failure and final defeat. "The body is the only medium through which the mind and the soul are developed for the upbuilding of character. Hence it is that the adversary of souls directs his temptations to the enfeebling and degrading of the physical powers. His success here means the surrender to evil of the whole being."

The religion of the Bible teaches that man's physical powers are a sacred endowment; that his body belongs to God; that it was formed in His image; and that the Creator will hold him responsible for its care and development. "If any man defile the temple of God, him shall God destroy." 1 Corinthians 3:17. The Saviour of men tabernacled in a human body temple; and should we lightly regard it? He carried it through the portals of the tomb to the light of the resurrection, and thus glorified it.

Often men squander the strength and vigor of youth as if these were a burden. True religion not only emphasizes the accountability of man to God for the preservation and care of his body, but it also restores to him the governing power over his appetites and passions, which, if not brought into subjection to an enlightened will, would undermine the foundation of health and also debase the moral nature. The final objective of life's training school is the development of perfect character. But character can be developed only through the exercise of the power of choice. If it were not possible to make a wrong choice, there could be no virtue in making a right one. Therefore the exercise of the power of the will in choosing the right by denying the demands of perverted appetites and passions insures not only greater physical vigor, but also added strength of intellect and force of character.

It was the surrender of the will to appetite which opened the floodgates of sin, misery, and disease upon the world. The religion of Christ imposes an effective barrier to health-destroying practices, and gives promise of the life that now is, as well as of that which is to come. Jesus said, "I am come that they might have life, and that they might have it more abundantly." John 10:10. The desire and purpose of the Father in heaven for His earthborn children are tenderly expressed in the words of Holy Writ, "Beloved, I wish above all things that thou mayest prosper and be in health, even as thy soul prospereth." 3 John 2. In the light of this declaration, would it be reasonable to suppose that we should find in the Bible no instruction which would aid our efforts to attain a high degree of physical health? Is the Book of Inspiration silent upon the great problems of life and health, which mean so much to our happiness, and which so vitally influence our character-building? There are few subjects which receive greater emphasis in the Scriptures. The very essence of the gospel is restoration, not only for the mental and spiritual, but also for the physical man. "Himself took our infirmities, and bare our sicknesses." Matthew 8:17.

The life of Christ and His ministry to the sick and suffering are inseparably connected. He sought to touch humanity at its point of greatest need, and the events of His daily life seemed to cluster about His ministry to the sick. He came to abolish death, and to bring "life and immortality to light through the gospel." 2 Timothy 1:10. "In Him was life; and the life was the light of men." John 1:4.

Wholeness — holiness — and health are closely related, not only in the derivation and meaning of the words, but also as exemplified in human experience and history.

HOW LONG THE LIFE?

How long did God intend the human race should run before it would fall under decay and finally become extinct? When Adam came from the hand of his Creator, he was perfect in organization, and bore the image of his Maker. How long did God purpose he should live before his form would be bent with age, his face furrowed with care, his steps unsteady and tottering, and his mind enfeebled and childish? The provision of the fruit of the tree of life and the water of the river of life was ordained for man to perpetuate the freshness, elasticity, and vigor of eternal youth.

The violation of nature's laws, with the consequent distress and premature death, has so long prevailed that these results are

commonly regarded as the appointed lot of humanity; but God did not create the race in such a feeble condition.

The life period of the patriarchs before the Flood was almost a thousand years. Obituary notices in the book of Genesis run thus: "And all the days that Adam lived were 930 years." "And all the days of Seth were 912 years." "And all the days of Methuselah were 969 years."

Moses, the first historian, gives a careful account of social and individual life during the early centuries; but not a case is recorded where an infant was born blind, deaf, crippled, or imbecile. We find no record of a natural death occurring in infancy, childhood, or early manhood. It was so rare for a child to die before its parents, that Inspiration considered such a case worthy of note: "And Haran died before his father Terah in the land of his nativity." Genesis 11:28.

But the ever increasing weight of sin, crime, and disease has wrought a great change. Suffering abounds on every hand; and infancy, childhood, and youth are not exempt. Until recently, the average length of life has been steadily on the decline. The nine generations preceding the Flood averaged 912 years. The first nine generations following the Deluge lived an average of 333 years. In Moses' time, the record declares, "The days of our years are threescore years and ten; and if by reason of strength they be fourscore years, yet is their strength labor and sorrow." Psalm 90:10.

At the present time, in the United States, the average longevity is about forty-five years.

Notwithstanding the marvelous achievements of modern medical and surgical science, and the great increase in the number of well equipped hospitals and sanitariums, also the large army of well trained physicians and nurses who are faithfully battling with disease, it is true that many of our fatal maladies are on the increase. (See chapter 5.)

SEED-SOWING AND HARVEST

We may well pause to inquire, What are the causes of this increase? and may it not be modified or averted? Is health only a matter of chance or accident? Does disease drop down from the blue and seize upon one and spare another? Does nature do her work at random, without reference to physical law? No, no! Health is not casual, but causal. It is a harvest, a crop, that is reaped as the result of a definite kind of seed-sowing.

Health is a condition in which all the organs of the body are coöperating in the performance of their work, in harmony with

immutable laws established by the Creator and written upon every nerve, muscle, and fiber of our being.

True religion is not a sentiment, but a principle. It takes into account and provides for the training of the entire man — mental, physical, and spiritual.

Is it not the function of true religion to teach the way of life, and to supply power to conform the physical habits to the laws of the Creator and His plans for the development of character? Disease is dis-ease, lack of ease, lack of harmony in the body; and it never comes without a cause. Often the way is prepared and disease invited by disregard of nature's laws.

IMPORTANT QUESTIONS

When one becomes ill, three questions confront the patient and the medical attendant: First, What is the disease? Second, What are the causes which have produced the unhealthy condition? Third, What treatment will most quickly and most safely restore the patient to health?

Without a knowledge of the nature of the malady, we could not intelligently apply therapeutic measures for relief. But the second question is of even greater importance — What are the causes? The very first thing to do in the treatment of the case is to ascertain and if possible to remove the causes of the disease. Any remedy which ignores these causes is in its very nature irrational. Often there is manifest a greater desire to be relieved of pain or other unpleasant symptoms than to correct the unhealthy practices that have caused the illness; but the path of self-denial is the path to health. Among the leading causes which undermine the constitution and invite disease, worry and overindulgence of the appetite occupy prominent places.

Worry is blind and unreasonable. It never accomplishes any good, but is one of the worst enemies of health. It causes indigestion in the daytime and insomnia at night. It depresses the action of the blood-making organs, hardens the arteries, raises the blood pressure, and thus deranges the entire machinery of



Worry is blind and unreasonable. It never accomplishes any good, but is one of the worst enemies of health.

the body. Fear is the only basis of worry. The certain remedy is trust. The man who believes that God feeds the sparrows and not one falls to the ground without His notice, that He tints the lilies of the field and has numbered the hairs of our heads, will learn to cast all his cares upon Him, and will not allow his mind to be harassed with fear that he may come to want or lose his hold upon life and health.

No factor over which we have control exercises a more profound influence upon our health than the food we eat. Does the proper sphere of religion include the diet question? Is dietetics a Bible subject? How far could a person read from the beginning of the Book of God before his attention would be arrested by the diet question?—He would find it in the first chapter.

But suppose he should begin reading the great prophetic book of Daniel. He would learn how three Hebrew captives, balanced by the religious training obtained at the college in Jerusalem, refused to injure their bodies and weaken their minds by indulging in the luxuries provided at the table of the king of Babylon, and how God signally approved their decision and course, and blessed them with exceptional physical health and intellectual attainments. True religion requires that we shall eat "for strength, and not for drunkenness." Ecclesiastes 10:17. Israel's great king wrote, "Put a knife to thy throat, if thou be a man given to appetite." Proverbs 23:2.

Some one has wisely said, "Let me prescribe the diet of a nation, and I don't care who makes their laws." What we eat, how, and how much, goes far to determine what we think and what we are. Bad tempers are often only the result of intemperance in eating and drinking. One cannot have war in the stomach and peace in the mind at the same time, except by great grace. A sour stomach is quite incompatible with a sweet disposition.

The enemy of mankind is still striking at the human family at its weakest point, that of appetite. He knows that if he can determine what goes into the stomach, he can also determine what comes out of the heart.

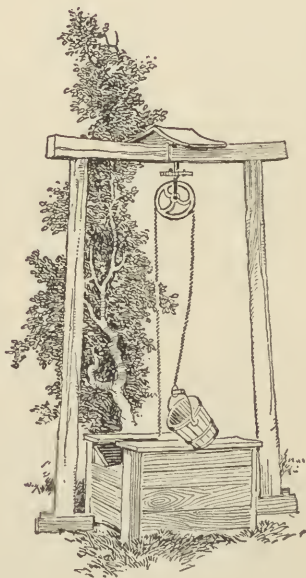
The apostle Paul counted it a necessary element in his success in the Christian race, that he keep his body under and bring it into subjection; and in so doing through grace, he was not fighting an uncertain fight, as one who beats the air. 1 Corinthians 9:26, 27.

The appetites of the flesh and the development of character are like two buckets tied to the ends of a rope and swung over a pulley. They do not ascend or descend together. When one goes up, the other must go down.

The natural inclination is to surrender the reins of government to appetite, and travel the road of least resistance; but the religion exemplified in the life of the Pattern Man, our Saviour, points out a different course, and provides ample power to hold appetite under the strict guardianship of the intellectual faculties. Thus it becomes a valuable servant, and not a severe master.

The religion of Jesus Christ is a religion of faith, trust, love, courage, and confidence. From the heart where these abide, fear, worry, anxiety, and dread are banished. Hope springs up and acts as a tonic, a medicine, vitalizing and energizing the whole being.

"My son, attend to my words; incline thine ear unto my sayings; . . . keep them in the midst of thine heart. For they are life unto those that find them, and health to all their flesh." Proverbs 4: 20-22.



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Recreation and Rest

No matter how good or useful a man's *vocation* in life may be, no matter how deeply interested he may be in it, he needs an *avocation* to supplement his *vocation*. To do one thing all the time without change is to wear out prematurely one set of the brain cells or one set of the organs of the body, while the others become useless and atrophy from disuse.

The avocation should always be quite different in nature from the vocation. If a person is doing hard physical work as his steady calling, he should have some time for reading and study, so that his intellectual faculties may have a reasonable chance to improve. If, on the other hand, the daily work is mental and sedentary in nature, he should have something in the line of physical exercise, whether it be labor or play, in order that his life may be preserved in good balance.

The Creator has so constituted man, His greatest masterpiece, that the highest efficiency of his being can only be attained by a harmonious development of his spiritual, mental, and physical faculties. The man who desires to become a tremendous worker in physical lines, will accomplish his end better by mingling *brain* work with *brawn* work than by confining his effort to purely muscular labor. Likewise, a man can reach a higher standard as a brain worker if he engages in some bodily exercise, than if he devotes all his time and energy to mental production. Lastly, every man needs the spiritual element in his life. He needs a real respect for himself and the world's need of him in his sphere of life, if he will have the best health and the most lofty purpose. Never did seer speak truer word than Solomon when he said, "Where there is no vision, the people perish." A great, unselfish dream for life is a tonic and a stimulant to a wealth of health.

VACATIONS

In addition to having some plan whereby the equilibrium is maintained by a daily interchange of activities, men and women should get away, at least once a year, for an entire change of scene and occupation. This is the thought enshrined in the word "vacation." We vacate, or go away from, our regular calling. Many feel that they cannot afford to do this; but as a matter of fact, within reasonable limits, the less the vacation costs, as a rule, the more valuable it is. In this respect, it is akin to the



At least once a year, men and women should get away from their usual occupations and spend a while in God's great out-of-doors.

lesson contained in the story of the young woman who requested her physician to prescribe a complexion improver for her. In reply, he gave her the following excellent advice:

"Get one pot of rouge (any kind of rouge) and one rabbit's foot (not necessarily a left hind foot). bury them together two miles from home (or from the line of any trolley or other means of conveyance), and walk out and back (in any and every kind of weather, wearing, if necessary, aetics or rubbers in rain or snow), so as to be sure those articles are still where you have buried them. Besides this, go to bed so that you will be sure to sleep eight hours; lie down, if possible, one half an hour after lunch; bathe in water as cold as possible within comfortable limits, giving yourself a good rubdown after the bath; eat three square meals of wholesome food daily, cutting out the sweets and the indigestive and innutritive pastry; drink six glasses of water, at least, during the day; see that the body's emunetories are functioning properly, and I guarantee you will then have a complexion that will stop the traffic on any thoroughfare you choose to grace with your presence."—Huber, *"Why Die So Young?"* pages 127, 128.

None of the things in this prescription would cost the maiden anything to speak of, yet they are of infinitely more value than a host of "flesh foods," complexion powders, and drugs of various kinds. So with the vacation: the family that can go for a hike in the mountains, carrying their kitchen kit, chopping their own wood, cooking their own meals, and sleeping by night with God's stars glistening in the heavens above them, will return to their work vastly more improved in health than those who journey in Pullmans and Packards and sleep in hotels while "doing" Yellowstone Park, Grand Cañon, or Yosemite.

GOD'S OUT-OF-DOORS

Nature is God's great physician. It is in Nature's arms and on her mighty breast that we get real recreation. This is the way to bring about a genuine *re-creation* of our spirits, our minds, and our bodies. The healing power of nature—the *vis medicatrix nature*—will do more to rebuild our worn-out hearts, minds, and bodies than all the fifty million dollars' worth of patent medicine sold in the United States each year. It was the great Broussais, a teacher of pathology in the faculty of Paris, who, when he died, left a legacy, a ponderous volume, which he said contained all he had learned in the practice of medicine. After his decease, his friends examined the book. To their surprise, they found that all the pages were blank with the exception of one, on which the following words were inscribed: "To maintain your health, keep your head cool, your feet warm, and your bowels open." In other words, a few simple things faithfully carried out are what count in the great game of health.

Nature's great domain is the place for *re-creation*. The pure air, the glad sunshine, the flowers, the trees, the giant mountains, the mighty cañons, and the rolling ocean, furnish surroundings that are truly health-giving. These all together form God's great dispensary,—God's out-patient department, where the elixir of life is prescribed and dispensed in ample dosage to all mankind. Outdoor life is a great medicine. Its influence is powerful to heal the ills caused by business and society life. Hiking in the forests, climbing the eternal hills, tramping over the rocks and cliffs of a rough coast line—these are the genuine sanatoria where lung and muscle should be rejuvenated. For pure, fresh air, with a goodly degree of motion in it, is the heavenly manna that Providence has provided for lung food. How little do we realize that we are more dependent upon the air we breathe than upon the food we eat! Man can live a very considerable period without food, but only a very brief period without air.

Infants and young children are especially benefited by a sojourn at the seaside. Sea air is very pure, and it is saturated with the iodine and other halogen healing salts set free by the breakers as they pound against the rocks and dash their foamy spray high upon the beaches. At the seaside, the atmospheric pressure is greater than in the mountains, and consequently the air contains more oxygen in the concentrated form of ozone. Air baths are worth as much as or more than sea bathing. Vigorous exercise on rising, in the cold, fresh air, is a great stimulus to health.

How much better is this sort of re-creation than that pseudo recreation obtained by hibernating in luxurious, devitalized theaters or dance halls, where people breathe and rebreathe their own toxic and bacterium-laden exhalations! How quickly we flinch at the thought of bathing in polluted water, and how little attention we pay to a polluted atmosphere!

The great out-of-doors is the cure *par excellence* for a shoddy nervous system. Walter Camp, one of the greatest coaches that Yale University has ever had, has well said, "Nature never intended a man to be old at thirty, fat at forty, and dependent at fifty on a trolley or a flivver to go a mile."

EXERCISE

How few American business and professional men and women spend an hour a day in real hard exercise! The greater portion of the middle and upper classes of our people early lose all their athletic enthusiasm. After they quit high school or college, exercise of any kind is almost entirely eliminated. We are so busy that we cannot take the time to walk, and consequently the muscles of our legs atrophy, and a big weight of fat rapidly accumulates in the middle region.

Walter Camp, in his splendid little book "Keeping Fit All the Way," in describing how nature, besides the bowels, has given mankind the kidneys and the skin as a part of the mechanism for getting rid of impurities, likens the body to a motor car with two cylinders. Should one of these stop, the other will run on for a time, but the wear and tear upon it are increased. So when a man ceases to exercise, his skin is no longer an important factor in carrying off bodily poisons, and an additional load is at once thrown upon the kidneys. Then fat begins to invade the muscular tissues all over his body. This makes for more muscular slackness and increased disinclination to work. Thus it comes about that he is carrying greater weight with less muscular strength to do it. The more fat, the less desire to exercise. He gets tired when he tries to do physical work. He knows he needs

exercise to reduce weight, but it wearies him so he will not make the effort. Quickly his powers of resistance lessen. A vicious circle has gained control of him. More fat, less work—less work, more fat and less resistance. It is as if a transportation company should keep increasing the load on its trucks while persistently lowering the horse power of the motors.

Yet, ten minutes each morning at strenuous setting-up exercises, following a cold tub and vigorous toweling, together with one hour a day for a stiff walk, aided by deep, oxlike breaths of fresh air, added to an abstemious diet, will start such people, inside of a period of two or three months, well on the road to health and vigor. Such will learn that the two best methods of rest for a tired brain worker are sleep and exercise, and the latter is just as essential as the former. The following from Weir Mitchell is right to the point:

“When in active use, the thinking organs become full of blood, and, as Dr. Lombard has shown, rise in temperature, while the feet and hands become cold. Nature meant that for their work they should be, in the first place, supplied with food; next, that they should have certain intervals of rest to rid themselves of the excess of blood accumulated during their periods of activity; and this is to be done by sleep; and also by bringing into play the physical machinery of the body, such as the muscles—that is to say, by exercise, which flushes the parts engaged in it, and so depletes the brain.”—*Weir Mitchell, “Wear and Tear,”* page 54; *quoted by Blaikie, “How to Get Strong,”* page 130.

A few good meals of fresh air, each consisting of from twenty-five to fifty deep inspirations in the open, are of inestimable value. If young men and women in high school and college were taught more about the motions of their own bodies, and less about the motions of the heavenly bodies, this earth, at least, would be a much more heavenly place to live in. In middle life, there would be much fewer saying, as did Rufus Choate, who died an old man at sixty, that “latterly he hadn’t much of any constitution, but simply lived under the by-laws.”

William Ewart Gladstone, four times prime minister of the British Empire, master of national and international finance, noted minister of foreign affairs, statesman, and author, found time, in spite of all his toil, to devote a whole precious hour each day to keeping his magnificent body in condition to be the proper companion for his mighty intellect and exalted character.

Not only did he exercise an hour a day, but he became famous for advocating the mastication of each mouthful of food thirty-two times. He not only developed his muscle, but he did not

forget the reverence due to his vital organs. The combination of both these methods makes a stronger man than either one alone.

Moreover, it is said of Gladstone, Garibaldi, and Lowell that they never rode when they could walk. And Gladstone indulged in far more strenuous exercise than walking. For an hour each day, the sage of Hawarden swung his ax, and the woods around his castle resounded with the sounds of his chopping and the smash of falling trees. He had learned that his liver was a sponge, and he knew that the proper thing to do with a sponge is to squeeze it—to squeeze it by swinging his ax high above his head, swaying his body from one side to the other, backward and forward. Yet, this man, like Cæsar, Cicero, Demosthenes, Webster, and Roosevelt, began life with a body far from naturally strong, and he lived to the ripe old age of eighty-eight years.

Recently there died in New York City, at the age of eighty-nine, Dr. Abraham Jacobi, the Nestor of American medicine. His specialty was the diseases of children. He ever insisted upon the need of "*hardening* the infant and child," and he left general directions for this especially in regard to the value of cold baths, showing how these increase the rapidity of the circulation in and under the skin, and telling how the best stimulation of circulation in general is, besides muscular action—exercise—the stimulation of the skin by friction and cold water; and Dr. Jacobi's advice is just as good for grown-ups as for the little ones.



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Roosevelt began life with a body far from strong. The robust health of his later years was due to his practice of taking a great deal of exercise.

SLEEP

And now about sleep—

Sleep, gentle sleep,
Nature's soft nurse, how have I frighted thee
That thou no more wilt weigh mine eyelids down
And steep my senses in forgetfulness? — *Shakespeare*.

Sleep, "Nature's soft nurse," is needed by the well, and doubly needed by the sick. She is indeed the mother of all nurses, and has powers to nurse man and womankind back to health and strength, far beyond all other nurses combined. What can we do to assist her to perform her beneficent offices?

Bunge has stated that "a man can live a month without food, but he must succumb after only a few days if he fails to sleep." Maria de Manasseine demonstrated that animals from three to four months old invariably died if treated in such a manner that they were unable to sleep. Simultaneously their temperature fell four or five degrees, and the number of their red blood corpuscles decreased from five million to two million to the cubic millimeter. Important changes in the brain structure were also noted.

Before we get sleepy, we get tired and suffer from a sense of fatigue. This is due to the toxic products that accumulate in our brains and muscles. This was proved by Weichardt. He made animals perform very fatiguing movements for a considerable period of time. Extracts from the muscles of these animals were then injected into the muscles of other animals, and these in turn showed symptoms of great fatigue. This and numerous other experiments clearly show that sleep may be in general attributed to a condition of auto-intoxication.

When we arise in the morning after a night of sound slumber, we find ourselves possessed of a feeling of well-being and freshness. This sensation is not imaginary; it is a real physiological fact, and is caused by the elimination of these toxic products during sleep. Contrariwise, after a sleepless night, we feel miserable and weak, and the supposition seems fairly well justified that we have not got rid of the hurtful poisons. Professor Bouchard has endeavored to show that urine passed during the night is much more toxic than that voided by day.

From all of the foregoing, it is evident that wholesome sleep is supremely necessary if we are to expect the maximum of efficiency and longevity.

And now to the matter of environment most conducive to sound sleep. The finest bedroom in the world, whenever the weather will permit, is God's great out-of-doors. Next in order comes a sleeping porch, and last of all the conventional bedroom. But if man must sleep in a bedroom, it should be large and well ventilated. Some one has wittily said that there must be plenty of fresh air in the country, because the farmers keep all the stale, bad air shut up in their bedrooms. At any rate, the windows should be open top and bottom, and if need be, nailed open—not shut. People do not catch cold from having plenty of fresh air. In fact, fresh air is the best cure for colds, pneumonia, and

tuberculosis. Night air is in many respects better than day air, because, especially in cities, it contains less dust and impurities.

The length of time needed for sleep varies with age and individual temperament. Infants and growing children need more than adults. Some people do as well on six hours' sleep as others on eight or nine. The main thing is to get enough sleep so that one feels thoroughly rested and delightfully fresh in the morning. Again, sleep during the early hours of the night and during the midnight hours is much deeper and consequently of more value than sleep at other hours. A noise that will awaken a person at four o'clock in the morning is generally unheard at midnight. The deeper the sleep, the shorter will be the time required for it. Going to bed early makes for early rising, which must have some hygienic and physiological merit, as the majority of centenarians were early risers.

DO NOT WORRY

The king of insomnia is worry. It puts sleep to flight more surely than any other one evil thing in the world. Well did the Master of men admonish us when He said: "Be not anxious for your life, what ye shall eat, or what ye shall drink; nor yet for your body, what ye shall put on. Is not the life more than the food, and the body than the raiment?"

And well also did the great apostle supplement the teaching of his Lord when he wrote: "In nothing be anxious; but in everything by prayer and supplication with thanksgiving let your requests be made known unto God. And the peace of God, which passeth all understanding, shall guard your hearts and your thoughts in Christ Jesus."

Peace is the antithesis of worry. A host of things that we do not understand, come into our lives. Even if we did understand them, we could not better or change them. To this Paul referred when he wrote: "Now we see through a glass, darkly; but then face to face: now I know in part; but then shall I know even as also I am known."

The Greek word that is translated "darkly" literally signifies "in a riddle"—"Now we see through a glass in a riddle." In other words, things are more or less mixed up in this life of ours. We do not understand why this or that calamity should be visited upon us. We know "in part" only, or as the Syriac translation puts it, "Now I know a little of much;" and as we cannot understand the heights or breadths nor fathom the depths of the experiences that come to us in life, there is naught to do but leave them in the hands of that kindly God who does all things well.

There can be no question but that the prayer habit has a physiological effect upon the body as well as upon the mind and the soul.

Huber refers to a remarkable sermon to which he once listened that touches beautifully upon this point:

"In studying the biography of any great man we are very likely to be impressed by the paucity of his deeds and sayings by comparison with the influence he has exerted upon his day and generation; we cannot, by a consideration of the former, reach any just estimate of that influence. In such study we eventually become impressed not so much by what the great man in the given instance did, or what he said, but by what he was, his character. This is so of Washington, of Julius Cæsar, of Lincoln, of many another. All men, great and small, do and say, for the most part, what their environment, what the exigencies of their time, require of them; but if we are to discern the intrinsic secret of the power which they have wielded we must study not so much their words and deeds as their personal habits.

"Jesus Christ preached and healed the sick with altogether peculiar power; but it is probable that His tremendous influence upon mankind since His advent has been mainly by reason of His character. And to understand this we must study His personal habits. Conspicuous among these was that of prayer. Again and again, being sought in the intervals of His benign ministrations, His disciples found Him in prayer. In my own ministry I have experienced nothing so fatiguing as an afternoon spent in sick calls. I confess this leaves me utterly exhausted, and only in prayer can I find refreshment of body and soul. I cannot sufficiently extol medical men who are with the sick all day long every day and halfway into the night. I marvel how they can endure the strain. The archbishop of Salisbury, in a talk with medical students, advised them, by way of relaxation from their duties, to cultivate poetry. I know a better pursuit than that; it is to cultivate the habit of prayer."—*Huber, "Why Die So Young?"* pages 292, 293.

Christ, the Redeemer of man, bore all the sins of a lost world upon His heart, yet He never worried. He found His refuge in the habit of prayer. Many of the great burden bearers of earth's history have followed in the footsteps of the Master in this regard. Oliver Cromwell, William E. Gladstone, George Washington, General Gordon, and Abraham Lincoln, one and all cast their burdens upon the Lord and trusted Him with earnest prayer. They humbly acknowledged and sought the help to be

secured from prayer. So indeed can all earth's lesser lights arise from their knees like these greater ones in a spirit of fortified calm to meet the tempests of their lives.

Worry is bad from many different standpoints. It is not only bad in itself as indicative of the absence of happiness, but bad because it is the cause of ills far greater than itself. It predisposes to diseases that otherwise would have been escaped altogether. Often it is the factor deciding the fatal termination of an illness from which, had it been absent, the patient might have recovered.

Worry is a most potent cause of sleeplessness, and sleeplessness is a greater consumer of bodily energy. Year by year, fretting, fear, and worry raise the percentage of deaths by suicide. Men who are beaten in a muscular fight are not, as a rule, permanently injured. "A beaten muscle is merely beaten; it is as good as it was, and possibly better." But the beaten mind is very much worse off. "Infinitely higher in organization—or rather the organization of the nervous system on which it depends—the beaten mind is much more than beaten; it tends to undergo vital injury. Unlike a muscle, it can recognize or brood over itself on loss or disgrace. Nothing killeth so surely as care."

Rising Tide of Physical Degeneracy

Diseases representing tissue degeneracy have in recent years, through their rapid increase, taken on greatly added significance as evidence of a general physical instability, which is just cause for grave concern. An unwarranted optimism because of an evident slight increase in the average length of human life, is altogether too prevalent. It is true that men have to a large extent secured control over plagues of smallpox, cholera, typhoid fever, yellow fever, and allied scourges, which formerly decimated whole cities and spread world-wide death and desolation.

The emphasizing of hygienic principles, the enforcement of improved sanitary laws, the discovery of immunizing principles and the serum treatment of various diseases, and the marvelous surgical triumphs of recent years, have all certainly made possible the saving of a countless number of human lives. There has also undoubtedly been a great lessening of infant mortality.

This progress in dealing with acute disease has truly resulted in a slight increase in the average length of human life — enough to persuade the casual observer that there is an improvement in the general physical condition of men. But in the light of more searching investigation of the subject, there is very little if any justification for this conclusion. While there has been a decided decrease in the devastating plagues of a few years ago, there has been a corresponding increase in the diseases due to subtle tissue changes in the vital organs — changes infinitely more significant, in that these diseases are largely the result of dissipation and wrong and artificial habits of living.

The sparing of a large number of infants that under previously prevailing conditions would have died, contributes in no small measure to the apparent lengthening of the average human life. However, this in itself may constitute a danger to the race, in that in a sense it nullifies the principle of the survival of the fittest, and preserves alive many who are by heredity tainted with physical infirmities and deficiencies which later will be transmitted in an exaggerated form to their children. As has been pointed out by Professor Cunningham, testifying before the Committee on Physical Deterioration in England, "There can be little doubt that the addition of these to the population must have tended to lower the general physical average of the people." The preservation of the physically unfit, while humane and altru-

istic, is nevertheless a menace to the human family, as it mightily promotes further and more rapid physical degeneracy.

The real and convincing evidence of the physical stability of the race is not in the number of individuals spared to live, but in the actual and relative number who reach old age. Statistics gleaned from all civilized countries indicate a steady falling off in the number of persons attaining even fifty years of age. As the great statistician, Frederick L. Hoffman, has expressed it: "There is, of course, no question whatever that the American death rate, using the term in a very comprehensive sense, has substantially declined within the last fifty years; but it is equally evident that this decline has been during the younger ages, and not during the period of life which economically is of greatest value. There is no doubt that the mortality of adult ages is still decidedly excessive."

The killing of vast multitudes of the physically best men in the great European war means that a much larger per cent of the children born will be begotten by men less fit physically, with the consequent stigmata of degeneration stamped upon these children. The result of war, as has been shown by many eminent writers of the past, has been a prominent feature in producing general race deterioration.

The great European struggle brought irreparable physical damage not only to the nations directly involved, but to the whole world; and out of this holocaust have come conditions infinitely more wasting and disastrous than the war itself. Great Britain is left with one and a half million deformed and crippled men. France has two million wounded men, and a legacy of one and a half million tubercular patients, the result of the destruction of a half million homes, and the leaving of two million homeless individuals exposed to sun and rain. Germany stands aghast at the thought of nearly half of her man power dead, crippled, or invalided, and of her two million empty cradles. In a speech made by a leader of thought in Germany, it was said, "Had our armies been victorious, the Pan-German empire could never make up to the Fatherland what has been lost through the spread of disease among the men of our armies."

INCREASE OF INSANITY

There is all too patent evidence of rapid increase in the diseases that denote general lowered vital resistance of the people and tissue degeneracy. Insanity, indicating brain degeneracy, has increased in this country more than 300% in the last fifty years. There are now more than 300,000 insane persons confined in the asylums of the United States, and 150,000 in England and

Wales. The late Dr. Forbes Winslow, one of the foremost of the world's authorities on mental disease, more than once said in public addresses, that in his opinion, the entire race is destined to become insane. In twenty years, in New York State, the number of insane people confined in asylums increased more than 100%, while the population of the state increased only 52% during the same period. There are at least half as many people outside asylums who are more or less mentally defective.

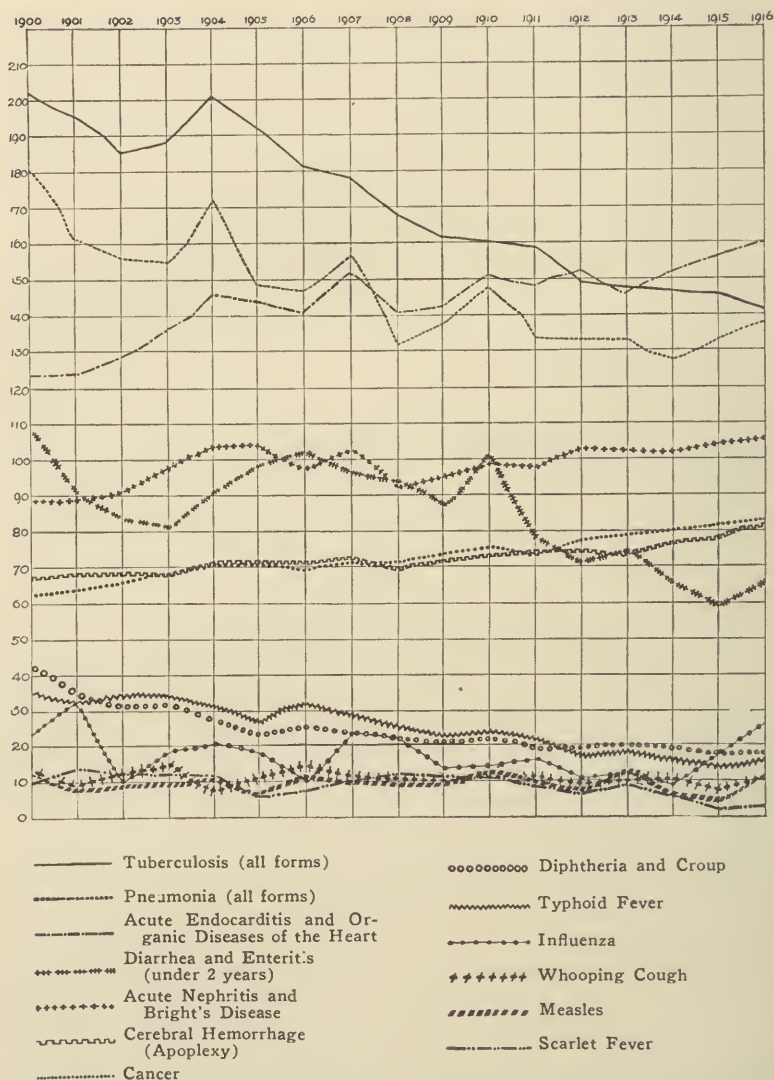
In addition to this immense army of insane, there are not less than 300,000 imbeciles and feeble-minded confined in our institutions. In England and Wales, there are 140,000 feeble-minded children in institutions, 90,000 of whom are crippled physically as well as mentally.

The New York Bureau of Municipal Research made a careful examination of 1,500 school children in New York City, and 90% were found to be defective either mentally or physically or both.

No restriction is placed upon the intermarriage of the defective classes; and they in turn reproduce families more degenerate than themselves, and in much larger numbers than the mentally strong, representing a very important factor in the increase in the diseases of degenerative character.

THE HEART AND THE BLOOD VESSELS

During the past ten years, mortality from heart disease has increased over 50% in this country. The report of the United States Census Bureau shows that the mortality from arteriosclerosis, or hardening of the arteries, during the past ten years, has increased nearly 250%. In other words, more than three times as many persons die in this country to-day of diseases of the blood vessels as died ten years ago. The Public Health Report of the United States Public Health Service for January 13, 1922, says that the trend of the death rate from organic heart disease is upward, the lowest recorded rate having been 111.2 to each 100,000 of the population for the year 1900, while in 1920 it was 141.9. The deaths from this cause in the United States for the year 1920 reached the enormous number of 151,000. That the number of deaths from organic disease of the heart is increasing at an alarming rate is indicated by the fact that there were 13,000 more deaths from heart disease in the United States in 1920 than in 1919. In a Senate report to the surgeon-general of the army regarding physical defects found in drafted men in the United States for the late war, it was noted that there were more than 100,000 men rejected for army service because of organic disease of the heart.



The above table, taken from the United States census report, shows the decided decrease in deaths caused by the transmissible or infectious diseases, such as tuberculosis, pneumonia, and typhoid fever; and on the other hand, a corresponding increase in such "degenerative diseases" as cancer, apoplexy, kidney disease, and organic diseases of the heart.

A famous French physician said, "A man is as old as his arteries." The earlier age at which hardening of the arteries is occurring is indicative of increasing physical deterioration and premature old age. There are now on record authentic cases of hardened or pipestem arteries in persons only twenty and twenty-five years of age.

Bright's disease of the kidneys, a disease of degeneracy, shows an increase of 131% in the United States during the past ten years, 82,000 dying of this ailment alone in the United States in 1920. The death rate from the degenerative diseases of the heart, the blood vessels, and the kidneys, including apoplexy, has increased until these diseases now claim over 350,000 lives annually.

Diabetes, a disease principally associated with degenerative changes in the pancreas and the liver, has increased 50% during the past ten years.

CANCER AND TUBERCULOSIS

Cancer, the very mention of which strikes terror to the heart, is increasing at an appalling rate, in spite of tremendous efforts made to stay its progress. Probably more men in the scientific world are to-day engaged in an attempt to discover the cause and cure of cancer than of all other diseases combined. The annual death rate in the United States now from cancer is nearly 100,000. One woman in every seven over the age of thirty-five, and one man in every eleven over the age of thirty-five, it is estimated, will die of cancer. This is a disease of civilization, being practically unknown among uncivilized nations. It has increased 500% in the last fifty years. In this country alone, no less than 300,000 persons are constantly suffering of this terrible malady.

While tuberculosis is due to a specific germ, yet, without the elements of lessened vital resistance and tissue degeneracy entering in, the disease could not gain a foothold in the body. A few years prior to the great war, there was a slight decrease in the number of deaths annually from tuberculosis; but with the exposure, deprivation, and suffering entailed by the war, there is again an increase in the deaths from this terrible malady. Tuberculosis may well be called "the great white plague." Every day, nearly 500 persons die in the United States of this awful scourge, or more than 150,000 every year. More than 500,000 persons in the United States are constantly suffering of this disease. Every year, more than 70,000 persons die in England of this same affliction. There are, as has been before stated, as

a legacy of the war, a million and a half tubercular patients in France, and in other European countries in proportion.

"THE GREAT RED PLAGUE"

Venereal disease, aptly termed "the great red plague," is more and more gnawing at the vitals of the human family, and is directly responsible for greatly augmenting the tide of physical degeneracy. Not only are diseases of immorality responsible for degenerative changes in the bodies of those directly infected, but the hereditary taint is transmitted to the families of the victims. Hereditary syphilis is one of the gravest of diseases. Children born with active manifestations of this disease usually die within a few days or weeks. According to Engel and Reimer, of children showing symptoms in the first four weeks of life, nearly all die; of those showing them in the second month, two thirds die; in the third month, about one half; and only about 28% of hereditary syphilitic children survive the first year.

Dr. Still found that in the families of 87 children who were under treatment for congenital syphilis, there had been 39 still births, 36 miscarriages, and 25 deaths, all attributable to congenital syphilis; and of these 87 children under treatment, 13 died while under observation. In other words, of 187 children, born or unborn, 113 were sacrificed through syphilis of one or both of their parents. Nor is the loss through death the only sacrifice of hereditary syphilis; for of the 25% or 30% showing syphilis during the first year of life who survive, the greater portion are relegated by the disease to the class of the unfit.

The famous Dr. Prince Morrow declared that in his opinion, the extermination of social disease would probably mean the elimination of one half of our institutions for defectives. In the opinion of very competent judges, social diseases constitute the most powerful of all factors in the degeneration and depopulation of the world.

DIMINISHING BIRTH RATE

The constantly diminishing birth rate in this and other countries gives further evidence of physical degeneracy in the world. Official reports from all civilized countries show the birth rate to be decreasing to an alarming extent. France has viewed with grave concern, for many years, the birth rate of 30,000 less than the death rate, and has sought to encourage the rearing of large families by offering tempting prizes. The war, of course, had a marked effect in decreasing the birth rate in France as well as in other countries. In one week in 1915, there were only 356

births in the entire country, instead of the normal number of 7,000.

The decline in the birth rate in England since 1876 is twice as rapid as in France. The decline for Germany since 1895 has been more rapid than that for England. Published figures indicate a decrease in the United States corresponding to that of other countries. The vital statistics report of the United States shows that if the percentage of children under sixteen years of age in the population should continue to decrease as it did from 1880 to 1900, there would be no children in this country 200 years hence. The decline in the birth rate is particularly rapid among the more prosperous and industrious element of the population. During a discussion of this subject at a conference held at Edinburgh, under the auspices of the Scottish Council of Public Morals, it was pointed out that among the chief causes for this decline were the high standard of living, the love of pleasure, the shirking of parental responsibility, the higher education of women, and the wider entrance of women into industrial and professional pursuits.

Vassar College graduates average but one child to every two graduates, as shown by the subsequent experience of these women. A projection of the curve of declining birth rate among college graduates gives the curious result that students graduated in 1935 would have no children. Inquiry into the matter of the number of children born in the homes of 461 leading scientific men of this country showed that nearly one fourth of these men are childless, and the average is only 1.6 children.

Inability of mothers to suckle their young is a further evidence of tissue functional degeneration. Dr. Holt, of New York, a high authority on diseases of infancy and childhood, states that in New York, at least three children out of every four born into the families of the well-to-do classes must be fed at some other fount than the maternal breast. An eminent physician, testifying before the Committee on Physical Degeneration in England, stated that only one child in eight born in Sheffield is nourished from the breast. Professor Bunge, of Switzerland, a recognized authority in the world, has called attention to the inability of mothers to nurse their children as being one of the results of the use of alcohol.

Early decay of the teeth is a further evidence of physical degeneracy. Careful examination of many skulls in museums shows clearly the inferiority of the teeth of our present white races as compared with those of ancient times or those of the present who continue to live under primitive conditions. The teeth of the present-day Eskimo are said to be still improving.



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The Eskimo lives upon the coarsest food, and often uses his teeth for purposes other than mastication of food. He is not afflicted with early decay of the dental organs.

The Eskimo lives upon the coarsest food, and often uses the teeth for purposes other than mastication of food. For instance, he chews his moccasin strings to make them pliable. The Eskimo has large, strong teeth, and a massive, bony jaw supporting them. In the white races, whose habits of life are such that little ordinary usage is demanded of the teeth, the teeth and the bony structures have degenerated to a considerable extent. It is estimated that at the present rate of increase in the decay of the teeth, in a comparatively few years, civilized races will no longer possess any dental organs.

The increasing number of persons suffering from faulty eyesight and hearing, from glandular defects—from thyroid and other gland enlargement and insufficiencies—and the increasing number of deaf mutes, epileptics, and other degenerates, as well as of neurotics and dyspeptics, and the tremendous army of chronic sufferers whose tissues and glands are undergoing degenerative changes—victims of chronic diseases which kill half the people who die in the United States—these all loudly testify to the increasing prevalence of degenerative diseases. One and a half million people die every year in the United States, half of them, or 2,000 daily, dying of easily preventable disease.

Again we repeat that this awful waste of human life is all the more significant in that it continues and increases in a time

when devastating plagues are almost entirely in abeyance; and it is more impressive still when we understand that it is largely the result of pernicious, soul-and-body-destroying habits of living.

DEADLY POISONS

Fortunately for the United States, the use of alcohol has to a great extent been banished from its position of king of degenerative habits; but it continues unchecked in other countries of the world. The degenerating influence of alcohol upon the nations of Europe is graphically portrayed by Bishop Latty, a French prelate, who says: "It is a subject which, in the past few years, has occupied and disturbed and frightened all Europe, and France in particular. It is urgent to make heard a cry of alarm at the peril that menaces us, so grave and so saddening are the facts before my eyes. . . . One is justified in believing that alcohol is, at the present time, the chief and most deadly of the plagues that infest humanity."

It seems quite apparent that tobacco has come to do more than divide the honor with alcohol in producing physical degeneracy. This subtle poison is causing a deep and deadly wound in the moral and physical stability of the human family. The figures representing the amount of tobacco annually consumed are staggering, and the hopelessness of the situation is emphasized by the fact that tobacco is consumed in enormously increasing quantities each year. And worse still, the tobacco habit among women is spreading with appalling rapidity. Thus one of the last barriers for the protection of children from hereditary taint is fast giving way. Women who develop poison habits degenerate much more rapidly than men, their more delicately poised nervous systems being more susceptible to degenerating influences. Few women who smoke can long resist



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The tobacco habit among women is spreading with appalling rapidity.

the temptation to use intoxicants, and few women who use intoxicants are long able to preserve a high standard of morality. Depierrie, in "*Le Tobac*," says:

"In our time, more than ever, these despairing words for the future are repeated everywhere: 'We are degenerate, we are in decadence.'" "The fact is incontestable that within the last half century, European societies present symptoms of physical and moral decadence, which call the attention of all those who are interested in the well-being of man. This degeneracy is seen in the failing beauty of the human type, the abasement of the human form, in the contemptible and suffering appearance of European populations, in the diminution of longevity, in the number of deaths exceeding the births, leading rapidly to depopulation.

"And moral degeneracy is recognized in sterility of intelligence, which produces no more great men or great things, in spite of the wealth of learning of our age.

"Intelligence and reason are being lost more than ever before, in the thousand forms of mental alienation. . . . The moral sense is also degraded, as seen in the ever increasing number of pitiable beings who are disgusted with life, and others who are forgetful of all duties,—slaves of passion, and willing in the committal of crime. . . .

"These facts are substantiated by the highest authorities. Physical degeneracy, moral abasement, sterility, excessive mortality, we must recognize as actual laws of our social estates, all of which were unknown in preceding epochs. To what can we attribute these evils but the causes which march parallel and immediately along with them?

"How has this so evident, so rapid decadence taken possession of us, in this time when advantages for the perfection of all humankind were never so favorable? What have we introduced into our customs, our habits, which has produced so rapid decay? For these strange and exceptional effects one must seek for a cause equally exceptional that did not exist before our great degeneracy, and which increases and marches parallel with it. One may recognize it in nicotinism; that is to say, in all the progressive physical degradation it involves. Yes, we may attribute to tobacco all the social evils that afflict our epoch; tobacco, which, after having been forbidden for its infamies by legislation in the seventeenth century, has insidiously crept into our life; tobacco, which, condemned as it was, as poisonous, unhealthy, ill becoming, dirty, is now imposed upon us as the height of elegance and fashion. It is everywhere, and accepted as a natural pastime and the most innocent of pleasures."

THE DRUG HABIT

Many people who question the ability of skilled physicians who have spent years in the observation and study of disease processes, take upon themselves the responsibility of diagnosing and treating their own maladies. This evil of self-drugging can scarcely be measured or estimated. There are upon the American market to-day more than twenty-three thousand varieties of patent medicines, advertised to cure everything from hardening



Tobacco has a peculiarly baneful effect on boys. The two short boys in this picture are smokers; the two tall, robust ones are non-smokers. All are fourteen years old.

of the liver to softening of the brain. They owe their marvelous popularity to the mystery and secrecy surrounding their composition. They may be properly classified under two headings; namely, harmless frauds, and dangerous, often habit-forming drugs, among which are morphine, cocaine, chloral, acetanilide, and alcohol. It would be well for any person, before beginning the use of any narcotic drug, to realize that the user becomes a slave, and that release from his servitude is painful and improbable.

It is estimated that there are at least four million unfortunate victims of morphinism and cocaineism in the United States, to say nothing of the millions enslaved to the coal tar products. The

endeavor to drown sorrow, the desire for temporary peace of mind, the unwillingness to bear pain, and later the lessened ability to endure pain, lead these millions of drug devotees more and more to subvert and submerge every faculty of the mind in the artificial dreamland of deceptive Elysian bliss. The benumbing of the body as well as of the mind is inevitable, and diseases of tissue degeneracy find fruitful ground in which to multiply. The annual consumption of one billion pounds of coffee, nearly one hundred million pounds of tea, and more than three hundred million pounds of cocoa, by the people of the United States, represents another important factor in the causation of the awful tide of physical decay.

And so in eating and drinking, in seeking unnatural, exciting, and exhausting pleasures, in a lack of sleep, in worry and anxiety, in drug taking, in immorality, indulgence in alcohol, tea, and coffee, and the tobacco habit, men and women everywhere are defiling and desecrating the body temple, and making of it a sacrifice on the altar of dissipation. Coupled with this awful increase in degenerative habits is the greatly lessened vital resistance incident to the exposure, starvation, and suffering of the war and post-war days.

And there is a significance to this topic which reaches beyond the mere physical phase. The apostle says: "We know that the whole creation groaneth and travaileth in pain together until now. . . . Even we ourselves groan within ourselves, waiting for the adoption, to wit, the redemption of our body." Never before in the history of the world has it been so emphatically true that the whole creation groans under the weight of physical distress. The "peace and safety cry" because of the slight increase in the average length of human life, and the promise of man's ultimate triumph over all disease, give but slight and very transient comfort in this dark hour. In our opinion, the world has entered upon a physically disastrous experience, from which it will never as a whole be rescued. The world is literally reeling and staggering as if it had received a mortal wound. The besom of destruction is sweeping the nations. We believe that the physical situation in the world to-day represents the terminal stage of the great controversy of the ages between the dominating forces of good and evil; that the devil, knowing he has but a short time to work, has come down in great power, and is working "with all deceivableness of unrighteousness." We believe that this waste of life and this increasing degeneracy reveal a constant, persistent, and ever more subtle effort on Satan's part to lead men to various *physical* digressions that will result in *spiritual* ruin. Men and women are as thoroughly deceived



Drug enslavement is the voluntary choice of millions.

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to-day as in the beginning by that voice which originally inquired, "Yea, hath God said?" The same subtle promise of immunity from the consequence of evil is given now as at the beginning, but with ever increasing deceit.

God says, "Whatsoever a man soweth, that shall he also reap." The devil says, There is no such thing as disease, therefore no such thing as reaping — no such thing as consequences of sowing.

God says, "Blessed are the pure in heart: for they shall see God." The devil says, Happy is the sower of wild oats, for by them shall he know both good and evil.

"God speaketh once, yea twice, yet man perceiveth it not. . . . He is chastened also with *pain* upon his bed, and the multitude of his bones with *strong pain*. . . . Lo, all these things worketh God oftentimes with man, to bring back his soul from the pit, to be enlightened with the light of the living." The devil says, Pain is an enemy, a voice to be hushed and stifled, which purpose morphine and the coal tar products — phenacetin and acetanilide and others — are especially designed to accomplish.

Christ says, "Let not your heart be troubled: ye believe in God." The devil says, Let not your heart be troubled; drown your troubles, and let them be submerged with drink.

So on and ever on to the complete perversion of every physiologic sense, the devil seeks to lead man, until no longer he can feel after God and find Him; to blind him so that he can no longer see God; to benumb his nerves, that the only means of communication between God and the heart of man shall be ob-

strusted, lest he should hear the voice of God saying, "This is the way, walk ye in it," and lest the light of the glorious gospel of Christ should shine into his heart.

With this rising tide of physical degeneracy and decay, and the ever increasing death rate from the diseases of degeneracy, it becomes very apparent that "except those days should be shortened, there should no flesh be saved."

It is fundamentally important to recognize that the only means of rescue from this awful tide of physical and moral degeneracy, and from these vicious deceptions, is the gospel of Jesus Christ. Just as surely as the devil is seeking to destroy men eternally through physical unrighteousness, just so surely was the Lord Jesus Christ manifested to destroy the works of the devil, that men might obtain physical righteousness. Jesus Christ came into the world to save the bodies as well as the souls of men. As Paul says: "Ye are bought with a price: therefore glorify God in your body, and in your spirit, which are God's." "I beseech you therefore, . . . by the mercies of God, that ye present your bodies a living sacrifice, holy, acceptable unto God, which is your reasonable service." "And I pray God your *whole spirit and soul and body* be preserved blameless unto the coming of our Lord Jesus Christ."



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A member of the government's Narcotic Squad inspecting a quantity of hashish cigarettes captured in a raid.

Personal Hygiene

The Scriptures teach scrupulous attention to hygiene as an essential to physical, mental, and spiritual health. The principles of personal hygiene were rigidly enforced in the camp of the Israelites, with the result that it could be said, "There was not one feeble person among their tribes." Laxness in the application of these principles has a marked detrimental influence upon the general health. With the physical condition impaired, the mental and spiritual powers must suffer.

THE SKIN

The skin is vitally concerned in the question of body hygiene. It has a very definite work to do, and cannot accomplish that work perfectly unless it receives reasonable hygienic consideration. Through the nervous system, the internal organs and the skin transfer their sympathies, their joys, and their sorrows. They are intimately connected; and when the skin is ailing for one cause or another, the general health is affected. Conversely, anything that tends to improve the condition of the skin, increasing its vitality, will exercise a beneficial effect upon the general health. Everyone understands that a good complexion is one index of good health, whereas a muddy, blotchy skin indicates ill health. Each and every element that can conduce to health or ill health, may have a direct effect upon the skin. Poor general health may be a factor in the production of a dry, sallow skin; and again, faulty hygiene of the skin may react in a still greater impairment of the general health. Thus is established what is known as a "vicious circle."

One should bear in mind that the skin is not merely a protective covering of the body. It is that, and very much more. It is an important organ, whose proper activities are indispensable to life and health, and whose integrity can be maintained only through the application of those hygienic principles necessary to the maintenance of physical and mental vigor.

Diet. The problem of what to eat, how much to eat, and how to eat it, enters into the question of skin hygiene. Errors in diet are frequently the sole cause of certain skin disorders. Muddy, greasy, acne-studded faces denote a lowered vitality, which is usually a result of indiscretions in eating and of faulty

elimination. Hence attention must be paid to the subject of dietetics, and the principles enunciated must be carefully followed.

Sleep. Loss of sleep is a contributing cause of skin disorders. Irregularity in this matter is sure to have its effect upon the general health, and in this the skin always shares.

Exercise. It was never intended that the human machine should be put to sedentary toil without a daily period of relaxation. Physical inactivity results in a stagnation of vital processes. One cannot hope for a clear, soft, beautiful skin if this most essential of all disease-preventing agencies is neglected.

Mental State. Melancholia and worry are the cause of much ill health. Such a state of mind brings on a depression of all vital activities, and skin specialists tell us that an inactive skin is often associated with it.

Bathing. The skin is not essentially an excretory organ. Perspiration is poured out for the purpose of cooling the body; it was not provided by nature as a medium for the elimination of waste. Nevertheless, traces of the same substances present in the urine are found in this skin secretion, and should not be allowed to accumulate on the surface of the body. The injunction, oft repeated, to bathe frequently in order to "keep the pores open," is not well founded. The *débris* from the skin surface is not at all likely to plug up the openings of the tiny sweat channels, for sweat is secreted under sufficient pressure to overcome any slight obstruction from this cause. Still, when we stop to consider that almost as much liquid is thrown out through this channel as through the kidneys, and even more in hot weather, we must appreciate the necessity of cleansing measures to dispel the odor, if for no better reason.

We do have another secretion, however, that is poured upon the surface of the skin through tiny channels that occasionally become clogged, causing pimples and comedones — commonly known as blackheads. This is an oily substance called "sebum," provided by nature to keep the skin soft and pliable, and the hair from becoming dry and brittle. The sebum hardens on exposure to the air, and if allowed to accumulate, undergoes degenerative changes that render it a most congenial home and nursery for disease germs, causing skin infections. Cleanliness is an important factor in the prevention of trouble from this source. The excessively oily skin found naturally during the transition period of youth will frequently be marred by comedones, notwithstanding the best of hygienic care. It is attributable to an abnormal activity of the oil glands.

Excessive Bathing. It is possible to overindulge in the pleasures of bathing. There is positive harm in over bathing, especially if soap is used each time. The harm comes in the removal of the natural oil, and the consequent production of a dry, scaly skin. There is no harm in a daily plunge followed by a brisk rub; but the best interests of the skin and the body are not served by a daily hot, soap bath. Not only is the circulation likely to be disordered by such procedures, but the vitality of the skin suffers. If daily baths must be had, let them be only warm — 90° to 98° F.—the best temperature for cleansing purposes; and let them be followed by the application of some suitable oil or massage cream, that the depleted skin may not suffer.

The Cold Bath. The cold bath in the morning, or in the evening just before retiring, followed by a brisk rub with a coarse towel, is a first-rate tonic for skin and body. It is a natural stimulant. The nervous system, and especially the mental processes, are sharpened, the circulation is quickened, the elimination of waste is speeded up, and more energy is produced. One of the most beneficial results of the cold bath is the immunity it seems to afford from colds. The reason for this is the degree of vitality maintained by one who takes a cold bath daily, and the consequent ability to overcome infection.

The cold bath may be taken as a spray, a dip in a tub, or — perhaps of greatest convenience in the home — by wetting a wash cloth, a sponge, or the hands, and applying the water in this way to the body. The latter method is the least harsh, and for the beginner, is the method of choice. As one becomes accustomed to the procedure, the dip in the tub may be chosen. This provides the acme of healthful stimulation. The bather should be sure that he responds properly. He should quickly be aglow and warm following the rub. If he warms up with difficulty, the bath is too severe and should be discontinued.

The Warm Bath. The prolonged warm bath acts in the capacity of a sedative. There is a dilatation of the vessels of the skin, with a resulting tendency to a reduction in the volume of blood circulating through the brain. It soothes the nervous system and aids in bringing sleep to the sleepless. The sweating that ordinarily follows may be prevented by a cold sponge. This should be a routine practice at the end of the warm bath, as otherwise there is danger of chilling and taking cold.

A toilet soap that is safe is one that contains a minimum of alkali, for alkali irritates and roughens the skin. A good soap

cannot be made cheaply, hence the price the purchaser is required to pay is a good index of the quality of the soap obtained.

An occasional salt glow (see chapter 10) is excellent for the removal of accumulated scaly skin, and as a general tonic measure.

It is unwise to bathe immediately after a meal. The digestive tract needs the blood at this time, and the circulation has been adjusted to meet this requirement. A bath within three hours after a meal will cause an expansion of the vessels at the surface of the body, and divert the blood from the digestive tract. This may cause indigestion.

Massage. Rubbing is a fine physiological stimulant for the conservation of skin and body health. Any agent that will quicken the circulation in the skin, and stimulate the glands of the skin to greatest activity, and that will remove the ever accumulating scales, will keep the skin soft, pliable, and healthy. (See chapter 11.)

Care of the Skin of the Face. Cold water is preferable for bathing the face. It improves the circulation through the skin, and tones up the elastic fibers of the skin, thus quite effectually delaying the onset of the evidence of old age — wrinkles. Great care should be exercised in the use of soap. The less frequently it is used the better.

Facial massage is beneficial, especially for those with a sallow, pimply skin. Pinching the face with the fingers will accomplish good, and can be easily done for a few moments after retiring.

The application of cold creams and face creams is often beneficial and can do no harm. Face powders are for beautifying effect only, and may contribute to the production of pimples. The powder causes a plugging up of the oil glands unless the skin of the face is thoroughly cleansed frequently, and kept soft through massage and the use of face creams.

CLOTHING

Clothing should be so constructed and worn as to prevent heat loss by conduction, yet not to interfere with evaporation of the perspiration. To meet this condition, attention must be paid to the quality and conducting power of the clothing chosen. A warm layer of air is a superior nonconductor; hence loosely woven, porous cloth is more desirable than nonporous material. The air contained within it will afford a warmer blanket than the cloth itself. For the same reason, two thin garments are to be preferred to one garment even doubly thick; for the layer

of warm air between the two acts as an air jacket, tending to conserve the heat stored up in water vapor next to the skin.

Silk and sheep wool are poor conductors. On the other hand, cotton and linen goods are good conductors, allowing the heat to escape readily. Wool is capable of absorbing a large amount of moisture without itself becoming wet. In other words, it is hygroscopic. Too rapid evaporation, with chilling of the body, is thus effectually prevented. By reason of the fact that it possesses a natural oil, it will shed water readily. Even when it is well soaked, only about 26% of the pores in a woolen garment are closed and their air displaced. Many physicians advocate



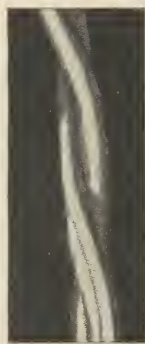
Silk



Wool



Linen



Cotton

Fibers, and therefore fabrics, differ much, as these highly magnified pictures of silk, wool, linen, and cotton fibers reveal.

the use of flannel underwear the year around in temperate and changeable climates, because of the protection afforded by these natural qualities. Very cold weather requires heavy woolens. It is a material essentially adapted to cold, damp weather.

For warm weather, garments made of linen, cotton, or silk are preferable. For most people, cotton is the most acceptable for underclothing. It is least expensive, it does not shrink as much as linen, and it does not readily absorb body odors.

Color. Another question that should have consideration in the selection of clothing is its color. When protected from the sun, color is of little consequence; then the material only is of importance. Dark clothing is warmer than light clothing, because it possesses a greater heat-absorbing power. Instead of reflecting the sun's rays, as light colors do, it collects and stores them. The relative heat-absorbing power of different hues may

be noted as follows, cotton shirting of uniform thickness being chosen for the observation:

White	absorbs 100 heat units
Light yellow	absorbs 102 heat units
Dark yellow	absorbs 104 heat units
Light green	absorbs 155 heat units
Turkey red	absorbs 165 heat units
Dark green	absorbs 168 heat units
Light blue	absorbs 198 heat units
Black	absorbs 208 heat units

It therefore follows that light colors — white and yellow — are the most suitable for summer wear and for use in tropical climates.

In temperate climates, it is advisable, from the standpoint of health and comfort, to adopt light-weight undergarments that can be used the year around, and to adjust the outer garments in accordance with temperature changes.

All Parts Protected. The body should be so clothed as to provide an equal degree of warmth to all parts. It is unwise to dress in such a way that the equilibrium of the circulation can be disturbed through the effect of cold on unprotected parts. A custom or fashion that would cause one to take risks with the health is wrong, and should not be allowed to dictate.

Clothing must not interfere with the perfect freedom of all parts of the body. Nature never intended the human form to be hobbled and incased in stays. An abdominal support, however, suitably fitted, is a wise provision in certain cases; and many women would enjoy better health, to say nothing of appearance, if the weakened abdominal wall were held up. Such a support in no wise militates against the action of any organ, and is consequently sensible and comfortable.

But there is no need of an artificial support for a young, vigorous woman who has borne no children. We are provided with strong abdominal muscles, entirely adequate to meet the demands of grace in posture, and the requirements of health. When normal muscular support is supplemented unnecessarily, muscular weakness results. Any muscle must be exercised to be kept in a suitable condition, and a weakened abdominal wall will be the inevitable heritage of an artificial support.

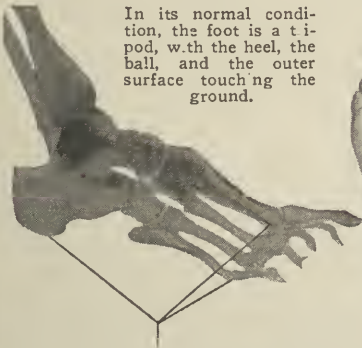
Elastic bands used as garters are harmful. They constrict the limb, and interfere with the normal circulation of the blood in the veins. The tendency of this interference is to the production of greatly dilated veins, which give rise to much difficulty later in life. The stockings should be supported from some part of the underclothing.



A high-heel shoe throws the weight of the body on the bones of the toe. In walking, the entire body is lifted by the action of these weak bones.



The position of the bones of the foot in a common-sense shoe. Note that the weight rests upon the ball of the foot.



In its normal condition, the foot is a tripod, with the heel, the ball, and the outer surface touching the ground.

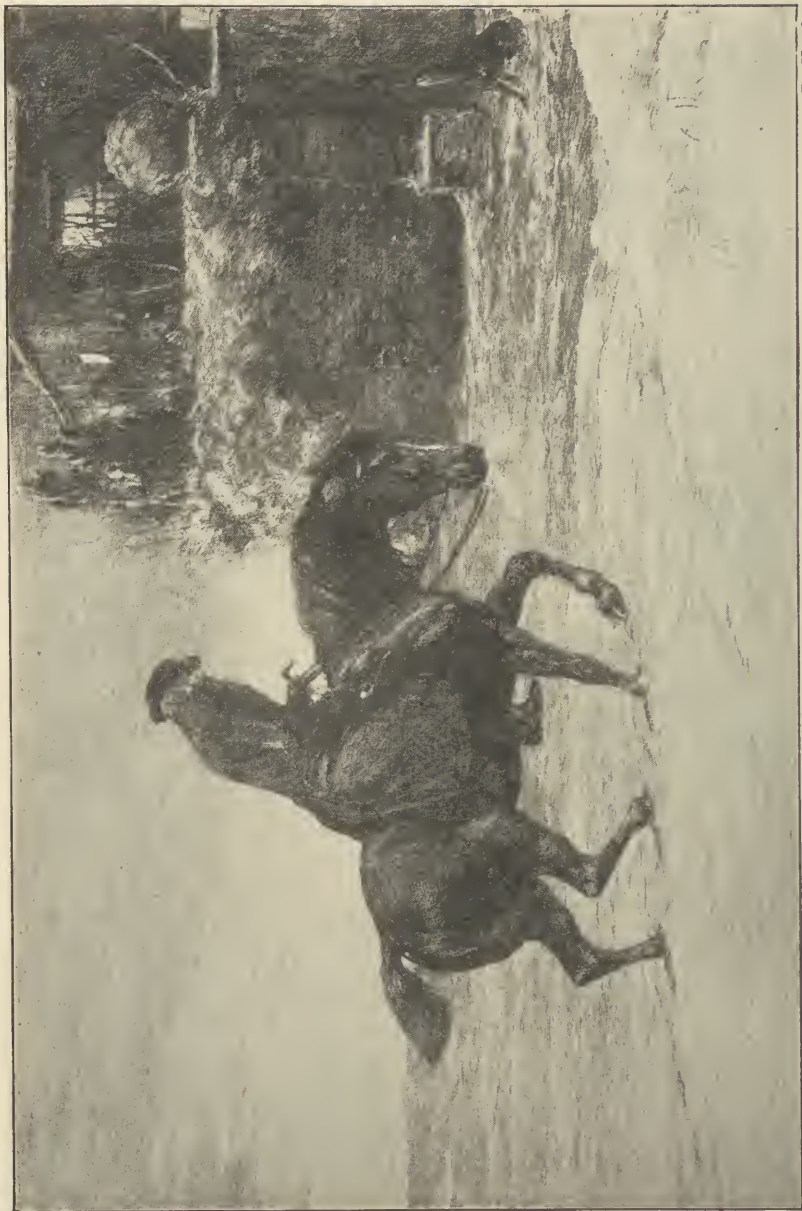
The Feet. The feet seem to be the point where many otherwise sensible people fail when providing themselves with hygienic and comfortable dress. Men and women alike squeeze their feet into the smallest possible shoes of fashionable cut. Women go to a still more injurious extreme, and select high heels in an effort to deceive the public still further as to the actual size of their feet. Comfort depends more upon the footwear than upon any other article of clothing. Good common sense, rather than fashion, should consequently be the dictator.

The toe of the shoe should not be pointed, and the rule should be to wear shoes that are at least three quarters of an inch longer than the foot. High heels weaken the arch. Corns, bunions, broken arches, ingrowing toenails, and general ill health may be the heritage from unhygienic shoes.



Left: Feet as deformed by pointed shoes. Right: Normal-shaped feet.

THE VILLAGE DOCTOR



CHAPTER 7

The Ministry of the Physician

Sacred and noble is the calling of the physician. He is the guardian of the physical and moral health of the community that he serves. He stands at the gateway as we enter this life, he watches at the door at its close. But the physician is not omnipotent. His wisdom and skill are at best restricted by human limitations. The impossible should not be expected of him.

TIME FOR DIAGNOSIS

Usually, in a case of acute illness, a physician is called; and after his first brief examination, it is expected that he should be able to make a positive diagnosis of the malady, and forecast the duration and outcome of the case. As a matter of fact, this is frequently impossible, even with the greatest knowledge and the widest experience. Many diseases are at their onset very much alike. For instance, scarlet fever, diphtheria, and acute tonsillitis all begin with fever, sore throat, red, inflamed tonsils, foul breath, rapid pulse, headache, and loss of appetite; and it may be several days before a skin rash, a characteristic membrane in the throat, a strawberry tongue, or microscopic study of the disease germs, would disclose the identity of the malady. If the physician is a young man, hesitancy in making early positive statements in such a case is often attributed to a lack of experience or skill.

A second physician should never be called in consultation or to see the case without the knowledge and consent of the physician in charge. Consultation is always welcomed, but it should be arranged through the attending physician. If another physician is desired to take charge of the case, the one already employed should first be dismissed.

CHOOSING A PHYSICIAN

In the choice of a physician, one should be selected in whom the patient can have the utmost confidence. He should be a man of thorough scientific training and of unquestioned ability and integrity. The only safe plan is to avoid carefully all advertising doctors, healers, and nostrum venders.

Some people exercise less foresight and intelligence in selecting a man to care for their bodies during illness than in securing a mechanic to repair an automobile. One would not think of

taking a costly watch or other delicate mechanism to a blacksmith to have it repaired.

The field of the healing art is flooded with physical tinkers who possess little or no knowledge of the fundamentals of physiology, anatomy, hygiene, and therapeutics. The marvelous structure of the human body is a masterpiece of the infinite Designer. In delicacy and intricacy, it exceeds any human product to the degree that Infinity is greater than humanity.

Is it not therefore unsafe and inconsistent, when the body is deranged, to intrust its repair to the hands of a mere novice? How many lives have been forfeited that might have been saved by greater skill and better methods of treatment! How necessary that the physician's efforts shall harmonize with those of nature, and of the Chief Physician, who is at work moment by moment, hour by hour, to build up, to restore, and to keep in repair the bodies He has created! The physician may set a broken bone, but he cannot make it knit. The surgeon may cleanse a lacerated wound and sew it up, but the healing is not his part. How often has the Creator been robbed of the glory due to Him, and credit for the recovery of health been given to men who were but little more than spectators to the healing process!

What a pity that so many physicians are strangers to the great Physician in Chief, whose life is the standard of our service — strangers to the aid that comes through trusting in divine power!

WHAT IS DEMANDED

Often the physician is confronted with conditions which call for quick action; but he must remain calm and composed, else he would be unable to execute with precision. The responsibilities and possibilities of his work weigh heavily upon him. A feeling of uncertainty and fear would make his heart faint and his hand unsteady and unskillful. But the assurance that there is a divine Helper in the sick room, an unerring Counselor by his side to sustain and guide him, brings quietness and confidence, and enables him to be at his best. The soothing influence of the Spirit of God upon the mind also brings hope and restfulness to the sufferer. Whether the patient is a Christian or not, he feels greater security and a more trustful confidence in the physician who fears God.

The life of the physician is one of constant self-sacrifice. Night and day he is "on duty." He knows no regular hours for rest, sleep, recreation, or meals. He is exposed to weather extremes and to the danger of contracting contagious disease. Money alone cannot compensate for such service. A greater

compensation comes as he realizes that his efforts have brought relief from suffering and have prolonged life.

Of all the vocations of men, that of the care of the sick affords the greatest opportunities for unselfish service.

SERVICE AND INSTRUCTION

In no other calling is it possible to symbolize so perfectly to the world the gospel of Christ. The path to the homes of the opulent and to the hovels of the poor — wherever there is suffering — has been consecrated by the footprints of the One who came to earth and chose this kind of ministry as that best suited to exemplify and illustrate the love of our heavenly Father and the tender compassion He feels toward His earthborn children.

His thought and effort were always for others. He did not seek to distinguish Himself. He would not commercialize His work. The question of compensation did not determine the quality or extent of the service He gave. He chose a life of poverty, of toil and sacrifice, that He might bring to the poorest and most needy of earth the imperishable riches of heaven.

In no other field of activity is it possible for the physician to render service so valuable as in that of education. He understands that disease is not a matter of chance or accident. He knows that nature does not do her work at random; and he seeks not only to teach right methods of treatment, but also to educate the people in right habits of living, that body defenses may be kept strong and disease prevented.

In these days of unparalleled extravagance, when custom and fashion and perverted appetites are warring against nature and undermining her physical, mental, and moral foundations, there is great need of faithful sentinels who will sound a warning. Through the pleasures of the palate, the indulgence of the passions, intoxicating amusements, and the mad scramble for gains, men and women are exhausting their mental and nervous energies. They are wrought up to snapping tension; and instead of calling a halt and applying the brakes, they plunge ahead, resorting to a "bracer" to spur them on during the day, and a sedative or a narcotic to produce drunken sleep at night. This sort of program has filled our public hospitals, but the stream widens.

Who is so well qualified to do this important educational work as is the physician? He is acquainted with the delicate structure of the human organism. He understands the laws which govern the healthy action of the mind and of the various organs of the body. Every day, he witnesses the wreckage and ruin that has resulted from a violation of these laws. He sees

the deplorable ignorance of many, who are unacquainted with the simplest principles of hygiene. Others he sees who are reckless or indifferent, who seem to throw away their strength as if it were a burden.

Do not these conditions place the physician under solemn obligation to instruct those who are ignorant, and to impress those who know with the necessity of making their knowledge a guide to daily conduct, that their powers of mind and body may not be crippled, and their families and the world robbed of the service which they might render?

PHYSICIAN'S CHARGES

The subject of the basis of the physician's charges for services is an important one, and is worthy of some explanation here. The work of the right-minded physician is a "profession," and not a business, and should not by him be put on a commercial or business basis. It is generally recognized that the primary purpose of "business" of any kind is the making of profits, and that the measure of the success of any commercial enterprise is the amount of money made. This is not the primary purpose of the physician's calling. Rather, it is to heal the sick, and to relieve suffering; to prevent diseases, and to teach his patients and the public how to avoid these. The best physicians recognize these purposes of their calling.

Nevertheless, the practice of medicine must have its financial aspects. The physician must live and support his family, and he must secure and maintain the equipment and the books necessary to give the best service to his patients. These demands require a substantial financial income.

Unquestionably there are instances where the physician fails to appreciate the principles which should govern his work, and is controlled by a desire to amass a fortune rapidly; but these are the exception.

An unbiased recognition of the physician's financial requirements will make it plain that his charges for his time and services cannot reasonably be on the same basis as those of an unskilled laborer, or of one who does not require an extensive equipment to serve his patrons. The years of education and training required must also be considered. At the present time, after a young man finishes high school, he must enter upon a course of seven years of expensive training before he is ready to take up his real work as a physician.

Many physicians take into account, in determining the fees charged for services, the patient's financial ability to pay. This is especially true of surgical fees. In this way, those who are

abundantly able to pay are enabled to assist the poor but needy patients who cannot pay what the services must cost. In many cases, the poor receive the benefit of costly surgical operations at a nominal charge, or entirely without cost. A careful consideration of this phase of the problem from the standpoint of the principles underlying the physician's calling will show the righteousness of this plan.

DIVISION OF FEES

Another phase of this subject which is of much interest is that of the so-called "division of fees." This question arises in connection with the referring of patients for special kinds of treatment, particularly surgery, by general practitioners to various specialists. Sometimes the surgeon is tempted to seek practice for himself by dividing his surgical fee with the physician who brings patients to him for operation; and the physician, instead of sending his patients to the surgeon who he knows is best fitted to do the work, is tempted to send them to one who is willing to divide the fees with him. This course is wrong, and works an injustice to the patients.

The rules of the medical and surgical associations forbid such things. To prevent this, the patient should know to whom his money goes,—how much to the surgeon, and how much to the family physician. There is danger, however, that the patient may not appreciate the responsibility and expenditure of time and effort required of the family physician in caring for him before and after a needed operation, and in making the diagnosis, deciding what must be done, who can best do it, and where it should be done. Frequently he is not paid for this service as he should be. He deserves better treatment.

THE "SPECIALIST"

The term "specialist" is too often poorly understood and misapplied. It should be used as referring to a physician who has had special opportunity for training and experience in some particular field of medical work. Usually he gives his entire time and attention to that particular kind of work. Such a physician may render invaluable service because of skill and knowledge which is not possessed by the general practitioner.

It is not unusual for men entirely unworthy of the name to be called or to call themselves specialists. In many instances, these are not regular practitioners, but only charlatans, who make a pretense of treating cancers, or special diseases of men, when they have no legal or moral right to practice medicine at all.

Section II—Home Hygiene and Sanitation

CHAPTER 8

Location and Construction

The sanitation of the home brings into account every item in the cause of disease and all the principles of hygiene. It is not practical, in this brief chapter, to discuss in full the subject; other phases are dealt with elsewhere.

THE LOCATION

It is poor economy to expend several thousands of dollars in building a home in a poor location. The world is big, and there are enough good locations to supply everyone. In choosing a place, secure if possible a well drained area, with no swamps or mosquito-breeding pools that cannot be properly drained and dried up. Get a place of good elevation, and set the building well up out of the ground. You can just as well have a basement aboveground, with dry walls and dry floor, as to make a cellar by digging down in the earth, where water will drain in, clothes mildew, the foundation timbers rot, and where stored food materials mold and decay. The basement is an important part of the home. Make it high and sanitary. Ventilate it and let sunshine flow into it.

Take into consideration the environment for at least 300 yards. Find out whether there are fly- or mosquito-breeding places near, or stables, or manufacturing places giving rise to odors, noises, soot, gases, dusts, or poisonous fumes; and if such are not there already, consider the likelihood of their future location. If in the suburbs, investigate the probability of getting improvements, such as roads, sidewalks, sewer, city water, gas, and street lights.

A dwelling should be located not nearer than 100 feet to a hennery, and still more distant from stock pens, and at least 75 feet from privy vaults, the surface drainage being guarded well that may convey decomposable materials within a radius of 75 feet. Avoid, too, a shady location. Trees are desirable and healthful, but ought not to shade the roof of the dwelling or stand too near the house. Nor ought they to shade the lawn to the extent that they make it barren. Secure a good sod about

the house. Do not bunch shrubbery or plant life so that it tends to hold moisture about the foundation of the house. These would better be a little distance away. If possible, avoid a location that will be shaded by a tall building. Also avoid "made land," as it is likely to contain material that favors rat harborage.

CONSTRUCTION

It matters little, from the hygienic standpoint, whether a house is built of wood, brick, hollow tile, stone, or concrete. It may be made rodent-proof or it may be made a den for vermin, this depending on the precautions taken. All openings and spaces in partitions should be closed by heavy timber, concrete, sheet iron, or tin, making it impossible for mice, rats, or other rodents to travel from basement to attic. Double floors with tar paper between are to be preferred; and the floors should fit tightly, to prevent dust cracks. There is no material that should be selected with more care than the floor. Use hard flooring that will take a smooth finish and not splinter when mopped. Battleship linoleum makes a sanitary floor when glued down, but linoleum that allows water and dirt to get under it is very unsanitary. A concrete, terrazzo, or tile floor is desirable for kitchen, pantry, and bathroom. Have finished floors. While large rugs, which may be removed often for cleaning, are permissible, small rugs, which can be cleaned weekly, are to be preferred.

Rooms should be so planned that sunlight enters them at least a portion of the time during the day. Plenty of window space should be allowed for ventilation as well as for good lighting. Care should be taken to place windows and doors so as to facilitate, as far as possible, circulation of air. No interior room should be used as a sleeping, living, or work room.

Lighting. Artificial illumination for nights and dark days may be secured by use of lamps burning gasoline, kerosene, or acetylene, or by the use of gas or electricity. Electric light is best, because it gives a constant light and does not use up the oxygen of the room. For the living rooms, the large inverted bowls of white glass are very desirable, as they give an even illumination over the room. The furniture should be so arranged that one does not face a window or a bright light while reading, but instead, the light falls over the left shoulder or comes from the rear. For close work, it is best to have a small lamp with its direct rays shaded, permitting the direct light to fall on the work in hand or upon the pages of reading matter. The sleeping rooms need no special provision for artificial light-

ing. Plugs by the bedside for a reading lamp are not to be desired, as no one should read while lying down. This is a common source of eyestrain.

Screens. Hall doors, windows, and other openings into the house should be screened; and it is economy to purchase a durable type of screen. Brass, copper, or galvanized wire screening is the best; and it should be of sufficiently fine mesh to insure the exclusion of small insects, such as mosquitoes. Eighteen to twenty mesh to the inch is required for this. In some countries where it is not practical to screen the house, net coverings should be made for the beds. This is done by building a rack above the bed, larger than the bed, and covering it with a fine-meshed mosquito netting with the border reaching the floor and weighted down.

It is to be recommended that all veranda space be screened, rather than the doors or windows leading out to them. The importance of keeping out of dwellings all manner of insect life is emphasized in other chapters of this book. A small hallway for overshoes, umbrellas, and raincoats is a great convenience and also a sanitary measure. It affords protection from cold drafts of air, which tend to chill the house if the door opens from the outside directly into the living room. This hallway may contain a doormat, which will prevent dirt and street filth from being carried into the house.

In a house for any given family, there should be provided sufficient room for proper ventilation, sanitation, and privacy. From a sanitary, social, and comfort standpoint, the tenement or apartment house has very little to recommend it. The few apparent advantages it seems to offer are tremendously overbalanced when the health and happiness of family life are considered. Sanitation has not yet advanced to the place where it obviates the danger to health found in overcrowded tenements.

The disposal of dust, dirt, garbage, and sewage is considered in the following chapter.

Bath and Toilet. There is no greater convenience to the home than an indoor bathroom and toilet. Such a convenience promotes better personal hygiene in affording facilities for frequent bathing and proper attention to the regular calls of nature.

Every person should have at least one evacuation of the bowels daily, preferably in the morning, following breakfast. Every house should have a bathtub. This can be used with or without running water. A daily bath is desirable, but a bath should surely be taken at least once a week.

Medicine Cupboard. An article usually provided in every house is a medicine cupboard. This may be permissible, but it

has been a frequent source of disaster. Yet it is better to have all home medicines properly labeled and placed than to have them scattered in pantry, cupboard, dresser, sideboard, and elsewhere. Often enough sirups, laxatives, carbolic acid, bichloride of mercury, and tincture of iodine are placed upon the same shelf, in similar bottles. Very serious accidents have occurred from using the wrong medicine, especially when the label is off the bottle, or when the medicine is taken in the dark. Children's getting access to the medicine cupboard is another great danger. Whenever there is brought into the house any drug that is known to be a caustic or a poison, it should be properly labeled immediately, with both its name and a poison sign. It should then be placed and kept on a high shelf, or in a cabinet under lock and key. This is important. The bathroom cabinet is the place for toilet articles, and should not be used for poisons. Neither should it be used for remedies for stock, nor for insect destroyers.

Menace of Fires. Do not forget the menace of fires. Improperly constructed chimneys, dry shingled roofs, uncared-for fireplaces, and poor wiring of houses are frequent causes of fires. Combustibles like kerosene and gasoline should be well protected. There should be particular places for matches. Cleanliness within the house, rubbish not being allowed to collect, and cleanliness outside the house, the premises being kept clean, are also safeguards against fire. Prevent paper, leaves, *et cetera*, from blowing inside verandas or banking up against the house. Water receptacles for fighting fire, and the family fire extinguisher, should be in every home. It would be well to keep pails filled with water accessible to the roof; also a convenient bundle of rags with handle attached, like a mop. This will sop out more fire on a roof than several pailfuls thrown upon the fire would quench.

The Kitchen. The kitchen is a very important part of the house. It should be of sufficient size to be well ventilated, and should have convenient openings to dining room, cellar, and pantry. The pantry needs sunlight and ventilation. Perishable foods should be kept in refrigerators or ice boxes when possible, and all food materials, especially those which have been cooked, kept covered. The refrigerator, upon which housewives so much depend to preserve foods, is likely to become a common source of food contamination if not well cared for. It should contain ice, and a temperature of between 40° and 50° Fahrenheit should be constantly maintained. If the ice is allowed to melt and the

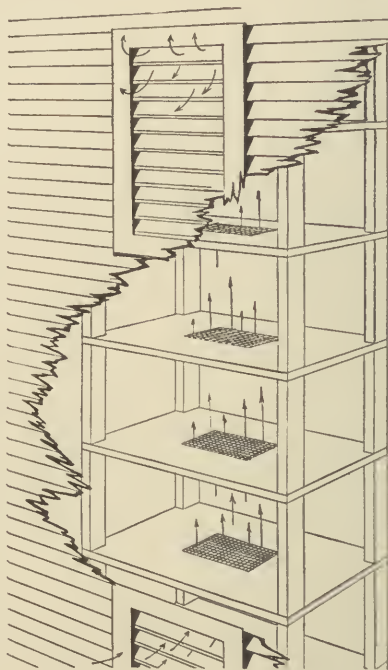
refrigerator warms up, the moist walls will breed bacteria, and these will drip down upon the food when the refrigerator is again filled and cooled.

The ice chest should be frequently disinfected by cresol, or, preferably, by scalding with boiling water and thorough airing. In very hot countries, a refrigerator depending upon the evaporation of water from a saturated fabric covering a frame is very satisfactory. Also, in many warm countries, an interior food closet, with screen shelves opening at the bottom into the basement or the area under the house, and above into a ventilated attic, is very practical for the cooling and keeping of food supplies. A cool place must also be provided for vegetables and canned foods, and close oversight kept of the entire food supply.

IMPORTANCE OF AIR

It frequently happens that persons lose sight of some of the most essential elements for their nutrition and comfort. This is true in regard to air. Deprived of food, man may live for weeks; he can go without water for days; but deprived of air, he can live but a few minutes. Air is a real material, so much so that it is a medium in which many animals swim, as fish do in water. It can be reduced to a liquid. It has many very important functions in the nutrition of our bodies, in that it provides oxygen for the blood, and is capable of conveying heat to and from our bodies, thus regulating the body temperature, and serves numerous other purposes in connection with human life.

It is called "the breath of life." Like many other substances, it is very susceptible to contamination; and since we take from fifteen to eighteen drafts of air into the body during every minute of time, we are liable to obtain it at times from sources not altogether safe. Out-of-door air contains slightly



Construction of an Interior Food Closet

over 20% oxygen, a little over 79% nitrogen, and a minute quantity — less than $\frac{1}{2}\%$ — of carbon dioxide. In air wherever it is found — in areas below sea level, or on mountain tops — with all variations of temperature and pressure, there are the same proportions of oxygen, nitrogen, and carbon dioxide. Another constituent of air is moisture; and this varies, depending on temperature and other conditions.

Contamination. Among the impurities of air may be mentioned disease germs, and accompanying odors due to bacterial action. Contamination may come also from gas works, slaughter-houses, stables, meat markets, and fertilizing establishments; and the air may carry various harmful particles, as of dust, wood, manure, cotton, wool, soot, and smoke, and the fumes of chemicals, like chlorine and ammonia, and other vapors from chemical substances. The function of clothing and housing as related to hygiene is chiefly to provide a comfortable temperature to be maintained in contact with the body's surface. When the air about us, under conditions of average humidity, is more than 80° or less than zero Fahrenheit, there arises a physical discomfort, which is caused by a disturbance of the forces that regulate and maintain the body heat. The normal temperature of the body is 98.6°, and this should be maintained at all times.

In low temperatures, the body must manufacture heat equal to that which is lost from the surface of the body through radiation, conduction, and evaporation. When the body is exposed to a temperature exceeding that of the body, *heat stroke* will result unless there is sufficient evaporation of perspiration to cool the surface of the body. It is claimed that the body temperature begins to rise when the temperature of the air is above 70° Fahrenheit, unless there is free perspiration on the surface of the body. With active perspiration going on, the heat produced and the heat lost remain balanced. If the atmosphere about us is laden with moisture, as just before a rainstorm, or in lowlands, or in some marshy land, or along the coast line, evaporation is lessened, and the heat balance is maintained by a large quantity of the blood being brought to the surface and cooled by conduction. In other words, humidity increases the air's conductivity of heat. Thus a humid *cool* climate gives a sensation of chilling to the body; while a warm moist air, since it lessens evaporation, is exhausting and debilitating.

The three qualities of air most essential to keep in mind are (1) its humidity, (2) its temperature, and (3) its purity. The danger from warm moist air is heat stroke, and the danger from cold moist air is chilling. When the skin surface becomes chilled, evaporation is greatly decreased, and extra work is thus thrown

upon the kidneys, tending to kidney disease. Chilling also predisposes to infections of the respiratory passages. Proper clothing may in a measure prevent serious results from a cold moist climate.

Careful experiments have shown that in rooms where the air is hot and moist, thus producing great discomfort, the use of electric fans or other mechanical means of stirring the air adds greatly to the comfort of the occupants.

The most desirable climate is that having a warm dry air, which is both exhilarating and stimulating. Hot dry air produces discomfort through irritation by its extreme drying qualities. Its harmful effects are felt in the nasal passages and the air cells of the lungs.

Ventilation. Air in dwellings often becomes laden with the exhalations from the bodies and lungs of people and household pets, and in hospitals, with the additional vapors and odors from the persons and discharges of the sick. Proper ventilation is the purification of the atmosphere of buildings by a constant supply of pure air. Other causes of impurity, such as excreta, should be promptly and properly removed, and vessels containing them disinfected. Attention should also be given to conditions surrounding buildings.

The purpose of ventilation is to provide air free from contamination, without producing discomfort. There are several considerations that require attention in ventilation; for example, the size of windows and the relative position of the air inlets and air outlets to the room, also the number of occupants, and whether the occupants are invalids who throw off a larger amount of infectious material than do healthy persons.

To determine accurately the amount of window openings needed to meet the requirements, also the number of cubic feet of air required for each individual in any given period, is rather impractical. Such things can be calculated by mathematicians; but there are so many factors to be considered, that one cannot trust altogether to mathematical calculations in planning for ventilation.

Air that has been breathed loses 5% of its oxygen, and takes on about an equal amount of carbon dioxide. The carbon dioxide is not in itself very harmful; but when contaminated by animal respiration, the danger point may be reached, and its inhalation then may cause fainting and asphyxia. The relative amount of carbon dioxide is a fair index to the total impurities that air contains, and forms a basis on which to calculate for good ventilation.

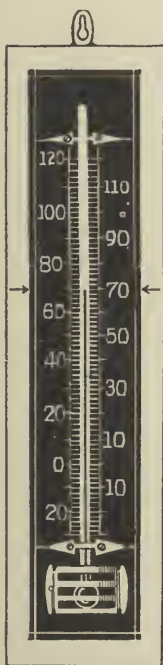
It is well to remember that warm air is lighter than cold. Warm air introduced through an inlet at the floor of the room immediately rises. Cold air admitted through openings at the ceiling flows down to the floor. If warm air is introduced at the top of the room, it will form a constantly thickening stratum, which will force the cold air down if there is an opening by which the cold air can flow out. But if there is no opening for the outflow of the cold air, the heads of the occupants are likely to be overheated, while the feet are cold.

Where the windows afford the inlet of fresh air into a room, as they do in most cases, there are two methods of ventilation without drafts: (1) admitting the cold air from the top of the window by fixing a board on the inside of the window, tilting it upward so as to direct the air toward the ceiling of the room; (2) providing a porous screen of permeable cloth thin enough to allow the air to pass through it in all directions, thus being diffused gradually into the room. Rooms need not, in order to permit ventilation, have high ceilings. Ventilation is not so much influenced by the number of cubic feet in a room, especially above the windows, as it is by the amount of floor space.

Nearly twice as much floor space should be provided for the sick as for the well, since a person having a high fever will often throw off as much toxic material as three or four well persons. It is important that sleeping porches and sleeping rooms be always well ventilated, and they require no artificial heat.

HEATING

The temperature of living quarters should range between 65° and 70° Fahrenheit. In sick rooms of fever cases, a temperature of 60° is quite comfortable to the patient; also for a work-room the temperature should not be higher than 60° Fahrenheit. Less atmospheric heat is required for those who exercise freely than for those in sedentary life. The ventilation of a room to meet everyone's requirements is very difficult, since old and young, robust and debilitated, require different conditions. The tendency of thin people is to have their rooms overheated, because of their lack of heat production. All



A Fahrenheit thermometer should be in every home. The temperature of the living quarters should range between 65° and 70° Fahrenheit.

should endeavor to wear a proper quantity and quality of clothing to maintain themselves comfortably in the same rooms occupied by others. We must further bear in mind, in cool climates and in temperate climates, that when the cool air is heated, it has a greater affinity or capacity for moisture, and has a tendency to irritate the lining membrane of the air passage unless some artificial method of moistening is found. This is brought about best by the teakettle steaming on the stove, or by plates of water set out in the living room, or a number of flowers or plants from which the air may extract moisture by evaporation.

Open fireplaces and stoves have some advantages as means of heating the air of a house, and a few disadvantages. The chief advantage of the open grate is that it causes a circulation of air, the impurities being carried out through the chimney. One of its chief difficulties is that so much heat goes up the chimney. From the standpoint of economy, it is very expensive; and it distributes the heat very unevenly. This is also true of the stove, to a somewhat less extent. There is also a tendency for the fumes and the dust and the soot to be scattered about the house.

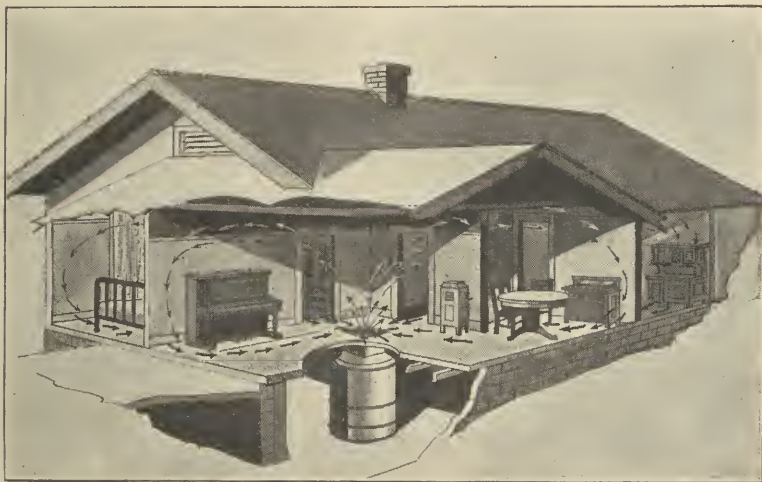
Gas and oil heaters consume large quantities of oxygen, and contaminate the air by their fumes, to the extent, at times, that actual danger is caused by the carbon monoxide.

In most homes, the hot-air furnace, conveying heated air through several pipes or a single grate, is most satisfactory. The air may be heated by the use of either steam or hot-water radiators before or after it enters the room. The hot-air furnace, when properly erected, with the fresh air coming from without, then heated by the furnace and at the same time moistened by the water pan before entering the room, is the ideal system of heating and ventilating for private dwellings.

In the installation of a hot-air furnace where there are a number of pipes leading to the different rooms, it is usually best to have the furnace placed on the cold side of the house, and the short pipes lead to the rooms on the windy side, the longer and more indirect pipes to supply the rooms on the protected side of the house. Great care should be exercised in setting up the furnace, that there be no openings between the fire box and the hot-air chamber, else there would be discharges from the fire box, not only of dust, but also of gas, which would tend to contaminate the air.

There is another decided advantage of the hot-air furnace in climates where the heat is needed for only a part of a day, or where the weather varies, one day being hot and perhaps the next day cool. These changes of temperature can be met in a few minutes with the hot-air system, at little expense.

The heating of rooms by steam or hot-water radiators is most satisfactory in hotels and public buildings where hot-air pipes would require too much space. Its chief advantage is its cleanliness; and for that reason, and that only, it often appeals to the housewife. This method of heating the air is known as the direct system, by which the air of the room is heated in the room; and it does not provide for much interchange of air. Then again steam radiators have the disadvantage that the water in the furnace must be brought to the boiling point before you get any heat; and on a mild day, you have the radiators steaming hot, and suffer as much discomfort from superheating as you would



In most homes, the hot-air furnace is most satisfactory.

from the cold. It is a very good system for cold climates with long winters, where artificial heat is needed day and night. The water once heated in the hot-water system will keep the house warm for a long time, and for that reason, does not require such frequent attention in firing as does the hot-air furnace. The circulation of the water or steam is not affected by the winds on the outside of the building. With this system, moisture should be provided in the form of water pans fixed in or on the radiator or at any convenient location in the room. The temperature of the water must rise to at least 140° Fahrenheit before the hot-water system is effective; and care should always be taken to have all the air drained out of the top of the radiator, in order to get circulation in the system.

CHAPTER 9

A Clean Home

THE WATER SUPPLY

Water is obtained from four sources, the first of which is rain. It is usually collected in cisterns; and when it is used for drinking purposes, special means should be provided for drawing off and discarding the water that first washes down the dust particles from the roof. After the roof is thoroughly cleaned, the rain water can be turned into the cistern. Then the water will be quite safe to drink, provided the cistern contains no cracks, allows no seepage of surface water, and is frequently drained and cleaned.

The second source is deep wells, which generally may be regarded as safe. However, the fact should be emphasized, that it is necessary to have the water tested for bacteria, as well as for any inorganic substances that it may contain in detrimental quantities. Deep wells may have gathered mineral constituents that render the water unfit for use. Wells, too, are always in danger of contamination from surface water unless cased to the very top, with a good protection over the top of the casing. Surface water has been known to percolate through fissures in rock and soil, thus contaminating the water of deep wells. Since the source of water that fills a well, be it deep or shallow, cannot always be determined, an examination should be made in every case. State Boards of Health often provide for this at small expense or without charge to those sending in specimens of well water.

The third source is small ponds and lakes; and frequently this is the only source for a community. *All surface water requires purification before it is safe to use.*

The fourth source is rivers and springs. The same care should be exercised in the use of spring water as has been suggested for deep well water. River water and surface water can be made safe by three methods now in use,—boiling, distilling, and chemical purification.

There should always be an abundant water supply provided; and the maximum amount of water required should be less than the minimum supply, even in the time of drought. There should be an average of thirty gallons of purified water a day for each person. The amount of water needed by the average person

varies with weather, exercise, and perspiration. From three to five quarts should be taken into the body daily. A part of this is, of course, contained in the food eaten.

Purification. The simplest method of rendering water safe to drink is to boil it. The dangers of unboiled water have been known for many centuries, even in countries where the people are entirely ignorant concerning bacteria, but believe there is something about the heating of water that makes it better.

Probably the most important instruction that can be given



Dept. of Public Utilities, St. Louis

Settling Basins in a Municipal Water System

in regard to drinking water is to urge the necessity of *boiling all water to be used for drinking purposes, unless one is absolutely certain that the water is pure* in the sense of containing no disease-producing germs. This applies not only to well and cistern water, and to that secured from lakes and streams, but also in many cases to water that is furnished through pipes by private companies or public or semipublic corporations. In the larger towns and cities of civilized countries, usually sufficient care is taken to provide pure water; but the householder should make sure of this.

People as a rule do not relish boiled water, for it is more or less insipid. At times, great risks are taken in drinking water from suspicious sources rather than to boil it. However, if boiled water is cooled and set in an ice box, so that it becomes practically ice cold, it is very palatable. At any rate, one may better go to the trouble of boiling enough water to drink, and use it even

though it is somewhat unpalatable, than to run the risk of typhoid fever and, in some countries, worse diseases.

Distillation also is a more or less simple process, though it requires some appliances especially constructed for the purpose. It is only adapted for the preparation of small quantities of water, in view of the fact that to vaporize water and then condense any very large amount would be a very expensive process. Distilled water is the only absolutely pure water known, containing neither organic life, dead or alive, nor any mineral



Dept. of Public Utilities, St. Louis

The accumulated silt and organic matter in a settling basin must be removed periodically.

elements. Rain water is distilled water. However, rain water often becomes contaminated by washing the air of its dust particles, and also from the surfaces with which it comes in contact. If distilled water is aerated, it is quite palatable. Water that contains a few of the mineral elements usually tastes better than distilled water. Many of these minerals are so stable that they do not break up in passing through the body, and thus are not changed. The use of distilled water is almost wholly confined to manufacturing and laboratory uses.

In municipal water works where the water is obtained from such sources that it necessarily contains much silt, organic matter, or other foreign material, *filtration processes* are very largely employed. In many such cases, it is necessary to supplement the settling and filtration by chemical methods for destroying the bacteria. For this purpose, chlorine in some form or other is the principal agent used.

In the household, or in cases where small amounts of water coming from doubtful sources must be prepared for use, the filter should be mentioned only to be condemned. The following quotation from a standard textbook on sanitation presents the matter very clearly:

"The domestic filters in common use are, as a rule, useless except for the removal of suspended matters such as iron rust, dirt, and other coarse particles, and worse than useless in respect of the removal of that which is claimed, but not accomplished, in that they engender a false sense of safety, while they favor the growth of multiplication of organisms."—*Harrington and Richardson's "Practical Hygiene,"* p. 418.

When water from suspicious sources must be used, and boiling is for any reason impracticable, there are chemical methods that are easy to apply and entirely effective. The most common of these is the use of chloride of lime, known also as chlorinated lime, or bleaching powder. This is added in the proportion of one part to 500,000 of the water. The method of using is as follows: A level teaspoonful of the chemical is dissolved by stirring in four pints of water. Of this solution, add one teaspoonful to each gallon of the water to be used, and allow it to stand for at least one half hour. This amount of the chemical does not affect the taste or smell of the water. This method has been used extensively in providing drinking water for soldiers in temporary camps.

One supposed danger in drinking water is that of lead poisoning from water pipes; but this danger does not exist except in case of very soft water (as rain water) in pipes that have not become oxidized. Copper and zinc are seldom found in drinking water. These occur only when derived from cooking utensils. Iron and sulphur will often give water an unpleasant taste, but in themselves are not harmful. Lime and magnesia salts make water hard, and much soap is required to form a lather of such water. Hard water has a tendency to produce constipation, and form gravel in the kidneys or the bladder. The amount of organic matter may be determined by adding a few crystals of permanganate of potash to a gallon of water. This turns the water a deep red when the crystals dissolve. If there is much organic matter present, this red color will gradually disappear. If in ten to twenty-four hours the water becomes clear, or if it turns to a light yellow, this is evidence that the water contains altogether too much organic matter.

The most dangerous types of bacteria in water are the typhoid germ, the vibrio of cholera, the dysentery germ, and the colon bacillus, which give rise respectively to typhoid fever, cholera,

dysentery, and diarrhea. Certain animal parasites also may be present in contaminated water, and may find their way into the body if the water is used without boiling.

Ice may be dangerous if made from unclean water. Disease germs are not necessarily destroyed by the freezing of the water. It is therefore essential that one know whether ice is made from pure water. In many ice manufacturing plants, all the water



Dysentery Germs



Cholera Germs

used for the production of ice is distilled before freezing. Where this is done, the ice is entirely safe.

Other diseases are often contracted through the use of the common drinking cup, or by contamination of the home water supply by uncared-for sewage. A few general rules will apply to the regulation of the water supply:

First, it should be adequate and from a wholesome source.

Second, it must have no connection with anything in the way of sewage drains, cesspools, or receptacles that would contaminate it.

Third, the water pipes should be protected from frost, so that freezing will not crack them and thus pollute the water supply.

Fourth, there must be no communication in any way between water pipes and sewage conveyers, either pipes or ditches.

DISPOSAL OF SEWAGE

The refuse that accumulates about dwellings and endangers health may be divided into three classes:

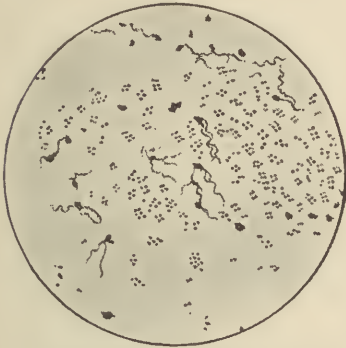
1. Ordinary house dirt, the sweepings of the house, and the ashes from stoves and furnaces.

2. What is known as kitchen waste, which includes scraps of food, decayed food material, leafy vegetables and peelings,

and all such unusable and rejected materials. This is generally classed as garbage.

3. Sewage, which is made up mostly of solid excreta of the body, with waste water from bathtub, washtub, and kitchen sink.

On account of their dryness, ashes and the dust and dirt issuing from the house are not so great a source of danger as are garbage and sewage. They can be put into covered utensils



Colon Bacilli, Which Cause Diarrhea



Typhoid Germs

and removed weekly or monthly, as is necessary to keep up the good appearance of the surroundings. There should be a covered receptacle in which to keep this material, to prevent it from blowing about the premises, and especially into the living apartments.

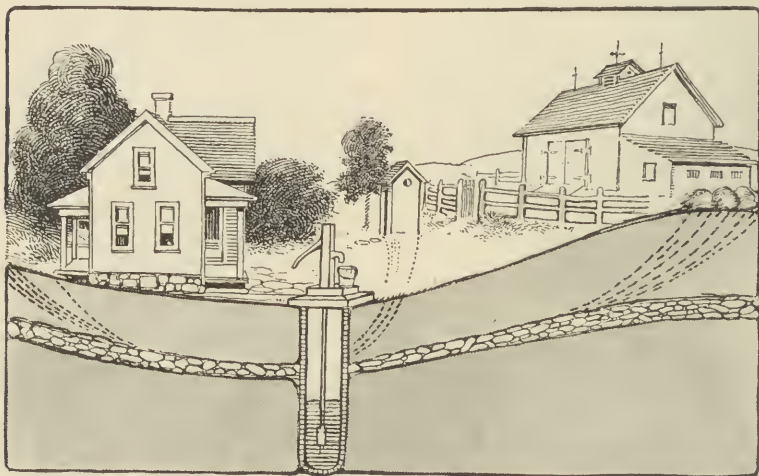
Insufficient care is more frequently taken of garbage than of sewage. Too often it is thrown out near the house, for chickens and other fowls to feed upon. A large share of this is never consumed, but is allowed to decompose, thus vitiating the air.

All garbage should be placed immediately in receptacles, preferably those with self-closing lids. This prevents it from becoming a breeding place for flies, or the means of drawing insect life near to the premises.

Disposition may be made of garbage in the following ways: One is to bury it in the earth, especially a garden spot, where it readily decomposes and enriches the ground. Another is to feed it to animals, where space permits, or where the feeding place is far enough from the living quarters to avoid all air contamination. The third method, that used by large cities, is to burn it in properly arranged incinerators.

Sewage is for the most part composed of slimy material of a variable character, usually of soapy or cloudy appearance.

The lighter material on the top is composed of feces in liquid form and paper, whereas the heavier material settles to the bottom of the sewage tank. Sewage is estimated to contain about a million bacteria to each cubic centimeter. These may or may not be disease-producing. The disease-bearing bacteria are usually those which come from excreta of sick people. There are two types of bacteria that actually grow in sewage material. One is the *aërobic*, which grows in the presence of oxygen; and the other is *anaërobic*, which grows best when the oxygen of the air is excluded. When an apple rots on the ground, we have an



Pollution of water is often a result of carelessness in locating the well.

illustration of *aërobic* bacteria. On the other hand, when a can of beans bursts as a result of bacteria acting in the closed can, we have an illustration of the *anaërobic*.

Essentials. To dispose of sewage properly, the following results must be secured: (*a*) the settling of heavier materials to the bottom; (*b*) the disintegration of this organic matter into harmless substances. This is accomplished by the growth of bacteria that produce chemical changes by means of the soluble oxygen of the water. Lastly there is a resulting destruction of the fecal bacteria, owing to the unfavorable environment in which they are placed.

Since the disposal of sewage becomes a real problem in connection with every residence, we will mention the methods most commonly used:

1. Surface Disposal. The chief difficulties with this are the unpleasant odors that arise, and the disease-bearing character of the decomposed sewage material. Sewage thrown on the surface of the ground has caused such diseases as typhoid and dysentery, and the contamination of the water supply. It affords a breeding place for flies, and this results frequently in the contamination of milk and other foods.

2. Cesspool. The second method of disposal is by means of the cesspool. Of this there are two varieties. One is known as the leaching cesspool, which is simply a covered hole in the ground by which the sewage is drained off, provided the ground is sufficiently porous for the fluid to leach away, leaving the solid matter to settle, decompose, and liquefy. After the *débris* finally fills the tank, it has to be cleaned out.

While this style of cesspool prevents unpleasant odors, it is no less a menace to the water supply when located near a well

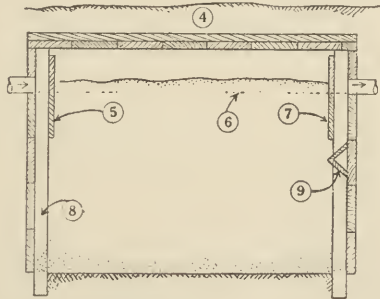


Plan view

1. Baffle
2. Baffle
3. Corner post 2 x 4 redwood
4. Earth
5. Baffle

SEPTIC TANK

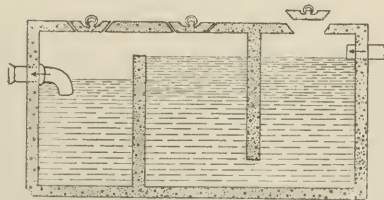
The figure on the right represents a septic tank, which is constructed of concrete. The sewage enters through the pipe at the right, passes through the three compartments, and discharges through the pipe at the left, as an almost clear liquid.



CESSPOOL

The above is a working plan for building a cesspool 3 x 7 x 4 feet, with an outlet. It is made of 2-inch redwood planks.

6. Water level
7. Baffle
8. Corner post 2 x 4 redwood
9. To deflect rising sludge from outlet



or a cistern; and it has the added disadvantage of being undependable as a system for the disposal of the sewage, since rains and a flooding of the soil may cause a good deal of surface drainage of the cesspool contents, which may contaminate the water supply of a community.

The other type of cesspool, more properly called the "septic tank," is the tight vault system, by which the contents are retained in a water-tight tank until the solid matter is broken up by bacteria, while the excessive liquids drain out through tile. This type is not always dependable, because the drainage through the surface tile may also soak down and contaminate the water supply. It is, however, the best system for the rural home. The accompanying illustration shows a very simple cesspool of this type.

3. Vaulted Privy. For country homes with no water supply for the house, the vaulted privy will prove quite satisfactory. In this method, the excreta are deposited in cement-sealed and water-tight pits, with the walls and the bottom of concrete, and the stool sealed tight. The opening should also be covered, so that no flies can pass in from above, or out from beneath.

4. Pail. Another method, much less desirable, is the pail or can privy, which may be in the house or outside, the excreta being deposited in a large pail fitted underneath the seat. This requires constant attention and is likely to be neglected. The excrement is buried in a trench. The toilet seats and all openings should be covered.

5. Passing On. The best method of sewage disposal is that of conveying it to a watercourse — either into a river, or to a distant sewage field where it can be treated. Or it may be piped out into a lake or an ocean. This is particularly applicable to a community or a city, and is the safest and most dependable method, as it affords protection both from odors and from contamination of water supply.

For further information on this important subject, and for detailed instructions in building vaults and septic tanks, we advise securing United States Public Health Bulletin No. 68, "Safe Disposal of Human Excreta at Unsewered Homes," and No. 101, "The Treatment of Sewage from Single Houses and Small Communities." These may be obtained by writing directly to the United States Public Health Service, Washington, D. C.; or write to your congressman at Washington.

Excellent detailed instruction is also given in a bulletin published by the California State Board of Health, Sacramento, California. This pamphlet is called "Special Bulletin No. 39." Other State Boards of Health issue similar bulletins.

Section III—The Home Sanitarium

CHAPTER 10

Hydrotherapy

Among natural remedies used in the treatment of disease, hydrotherapy ranks first in importance and in its wide range of usefulness. Persons who have used and studied it longest, find it most scientific and at the same time most practical. Large volumes have been written regarding its principles and application. Only a few of the simplest principles can be considered here, and only those methods that can be readily and successfully used in the home will be described. Treatments requiring sanitarium appliances are only briefly mentioned. Fortunately, acute illnesses commonly treated in the home require but little and very simple equipment. However, careful and accurate observance of details is very necessary.

Water is used both internally and externally. Used internally, it is chiefly a matter of water-drinking, in which the water itself is the principal agent. Heat and cold are also applied internally by means of water, as in drinking hot or cold beverages and in the use of hot and cold enemas and vaginal douches, ear irrigation, *et cetera*.

The greatest advantage of water in treating disease is as a means of applying heat and cold. For this reason, the presence of minerals in the water adds nothing to its effects, and may even be a disadvantage.

EFFECTS OF HOT AND COLD WATER

Reaction. When one bathes the face in cold water, or takes a quick dip or plunge into cold water, there is experienced a delightful feeling of invigoration with quickened circulation, and soon a glow of warmth in the skin. There is also greater energy for muscular or brain work, and every faculty of the body is more alert and active. These changes that occur as the result of applying cold water to the skin, are spoken of as *reaction*. Persons in vigorous health react well and thoroughly to cold water, especially after they have become accustomed to its use. Such training may need to be quite gradual, but the results in better health and vigor are well worth the time and effort necessary to secure them.

In treatment of the sick, the securing of a reaction is very important, for upon this we depend to stimulate the activity of various organs of the body that may not be working normally. Often it is difficult to secure a reaction. The patient's circulation is poor, or he chills readily. In many instances, the cold water must be applied to only one part at a time, possibly after a fomentation or other hot application has first warmed the skin, or while such hot applications are being made to other parts of the body. The cold water must be applied with energetic rubbing, as with a rough towel or mitten dipped in cold water. Usually the patient should have a hot bath before a cold shower, spray, or pour; and a patient in bed should have a hot foot bath with fomentations to some part of the body before or during a cold mitten friction or a cold towel rub. Some even require, as in colds and influenzas, a thorough sweat before any cold can be applied, and hot applications must be continued while the cold rub is being given. Hot water bottles, hot bricks or soapstones, and hot drinks, are also to be used. The patient must be warmly covered with blankets, exposing for treatment only a single part at a time.

Lessening Congestion. When some organ or part of the body is congested with blood, hot baths or fomentations relieve this by drawing the blood to the surface and to the limbs. When the head is hot and throbbing, a hot foot bath helps greatly. When the lungs are congested, a hot foot bath and very hot fomentations over the congested part draw the blood to the surface and to the feet.

Ice bags and cold compresses are also helpful in reducing congestion, when applied directly over the congested part. When the head is hot with fever, cold compresses changed every three or four minutes may be used, or an ice bag applied to the head.

An ice bag may be applied over an acutely inflamed appendix or to an infected breast to help lessen congestion and consequent pain.

Congestion is relieved by hot applications because they *draw* the blood to the surface. Cold applications reduce congestion by contracting the blood vessels in the congested part, and so *driving* the blood away. Heat alone should be used in treating some congestions or inflammations, such as lung congestion and pleurisy. The ice bag alone may be used, as with an acute, severely inflamed breast; or better still, the ice bag may be applied directly over the inflamed part, and hot applications at a distance, as with acute appendicitis—the ice bag over the appendix, and a hot pack to the legs and feet.

Treating Fevers. Hydrotherapy is the most efficient means of treating fevers. The high temperature is controlled by cold applications and kept within proper bounds. The mere reduction of the fever, however, is not so important as the sustaining of such vital functions as the circulation and kidney action, and the protection of the nervous system from the poisons of the infection. Hot and cold applications increase the burning up of fever poisons and help the kidneys to get rid of them. Free water-drinking is here most essential. The white blood cells are increased in number, and their activity in destroying germs is greatly stimulated. There are no drugs known that accomplish these very necessary results.

Where there is chilliness, hot applications or even sweats must be used before cold applications, so that the patient will react perfectly. This one common-sense principle is very important, and must not be forgotten in such diseases as colds, grippe, influenza, and pneumonia, and even in some cases of typhoid fever.

Effects upon Internal Organs Through the Nerves. An ice bag applied to the chest over the heart, in case of heart disease and rapid pulse, slows the heartbeat and increases its force. A hot water bottle over the stomach increases the flow of gastric juice, and improves digestion, where this is slow and defective. A fomentation over the abdomen in acute diarrhea lessens the pain and decreases the frequency of bowel movements. These effects are produced through the nerves connecting the skin with the internal organs. Many other such effects may be produced by hot and cold applications.

Effects upon the Blood. Hot applications followed by cold applications, especially with rubbing, greatly stimulate the blood vessels and the circulation. They also increase the number of the red and white blood cells in active circulation; and after a series of treatments, there is found a permanent increase in the coloring matter of the blood (hemoglobin) and in the red and white cells. These effects, together with fresh air and sunshine and nourishing food, are very helpful in treating anæmia and other diseases of the blood. The increase in the number and activity of the white blood cells resulting from alternate hot and cold applications is often life-saving in such infections as blood poisoning.

Effects upon the Glands. It has already been mentioned that a hot application over the stomach increases the flow of gastric juice. Cold applications, especially ice, retard secretion for the time being; afterwards, when the reaction comes, there is an increase in secretion. These same effects may be produced by heat or cold upon other glands, as the stimulating effect of a

fomentation over the liver and intestines, upon the flow of bile and intestinal digestive juices. Hot baths and sweats, and fomentations over the kidneys, increase the flow of urine. Opposite effects may be produced by cold or chilling, but of course are not in this case desirable.

EQUIPMENT FOR HOME TREATMENTS

For the giving of hydrotherapy in the home in acute and in many chronic diseases, only very simple appliances are needed. While some substitutes may be used in emergencies, yet it is much better to provide the things listed below.

1. One set of six fomentation cloths—wool or half wool—each 30x36 inches. Four may be cut from a single blanket.
2. One hot water bottle
3. One ice bag
4. One pair of rough friction mitts
5. One deep elliptical foot tub

Towels, sheets, and blankets will be found in the home.

If in addition to these there are the conveniences of an ordinary bathroom and kitchen, with the usual bath and bedroom linen, little else is needed for general use, and special appliances for certain diseases need not be purchased ahead of this need.

In giving treatments, seemingly small details are of great importance, and disregard of these may mean failure. Be sure to follow directions carefully, and above *all*, use that most indispensable faculty, *common sense*.

Remember that chilling the patient can do no good, but on the other hand, that cold water must be used *cold* (and it will feel cold), or little good will be accomplished. Hot applications must be *hot*, not lukewarm, and mere complaint that they are hot is not reason for cooling them off before they are applied.

COMMON NAMES OF TEMPERATURES

“Heat” and “cold” are comparative, not absolute terms, and must needs be defined. This cannot be done with accuracy, since people differ in their toleration of heat and cold. The sensation produced varies according to the condition of the skin, its previous temperature, vigor of circulation, season of year, *et cetera*. The usual limits may be defined in terms of degrees as follows:

Very hot	104° F. and above
Hot	100° to 104° F.
Warm (neutral 94° to 97°)	92° to 100° F.
Tepid	80° to 92° F.
Cool	70° to 80° F.
Cold	55° to 70° F.
Very cold	32° to 55° F.

FOMENTATIONS

A fomentation is a local application of moist heat by means of cloths wrung from hot water.

Requisites: A deep dish pan or large kettle of water should be kept actively boiling over the fire. A large cover will be helpful in holding the heat. A set of six fomentation cloths, a Turkish towel, a hand towel, a sheet, and a bowl of cold or ice water are needed.

The Patient and the Bed. See that all clothing is removed, or at least bare a larger area than the part to be treated, and protect the clothing with large Turkish towels. See that the feet are warm, and kept so during treatment. If they are cold, a hot foot bath should be given, or hot water bottles applied.

Protect the bedding by a blanket or sheet folded lengthwise and placed under the patient. After applying a fomentation, cover it with a dry cloth or newspaper, in order to protect the bedding over the patient.

The Fomentation. Prepare a set of six fomentation cloths, thirty to thirty-six inches square. Four of these may be cut from a single blanket. The material should be half wool. Three cloths are necessary for one fomentation where they are to be very hot—one for the dry covering, and two to be wrung from boiling water for the inside wet part. Where less heat is required, one inside cloth may be sufficient. Two such fomentations are necessary, if the best results are to be obtained. Spread out on the table the cloth for the dry covering. Fold together in three thicknesses so as to make a long, narrow piece, the cloth or cloths to be used inside. Twist this as in wringing clothes, and immerse the entire cloth, except the two ends, in the boiling water. The ends may be held out of the water by applying the cover tightly over the kettle. Leave until thoroughly soaked with the boiling water, then wring quickly by firm twisting until water no longer runs from it. If held up by one end, the cloth will quickly untwist to its original one-third width. Place this across the middle of the dry fomentation cloth already spread out on the table. Fold the dry ends over the wet center and then fold the dry outer cloth about the wet one. In the folding, the fomentation may be made the right size and shape for the part to be treated.

If the surface of the fomentation to be applied to the patient is again doubled together or rolled, it can be carried with less loss of heat. The fomentation should be large enough to cover a much larger area than the part affected.

Procedure: The fomentation should lie closely in contact with the skin, and be renewed in five or eight minutes, or in case

The APPLICATION



1. Spread out on the table the cloth for the dry covering. Fold together in three thicknesses so as to make a long, narrow piece, the cloth or cloths to be used inside. Twist this as in wringing clothes, and immerse the entire cloth, except the two ends, in the boiling water. The ends may be held out of the water by applying the cover tightly over the kettle. Leave until thoroughly soaked with the boiling water.

2. To wring, grasp the dry ends, twist the cloth several times, then stretch out. This wrings out the boiling water without burning the hands.

3. Place the hot cloth on a dry one that is large enough to fold over well.

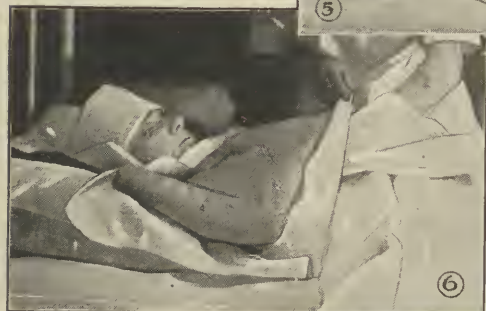
4. Roll it up to retain the heat while carrying it to the patient.

of FOMENTATIONS

REQUISITES: A deep dish pan or large kettle of water should be kept actively boiling over the fire. A large cover will be helpful in holding the heat. A set of six fomentation cloths, a Turkish towel, a hand towel, a sheet, and a bowl of cold or ice water are needed.

5. After placing a towel over the area to be treated, apply the fomentation, tucking it in well; then, to protect the bedding from dampness, adjust another towel over the fomentation cloth. Keep an iced cloth on the head, changing whenever it becomes warm.

6. With a dry towel wrapped about the hand, reach under



the fomentation and towel already on the patient, and wipe off all moisture. The patient can endure a hotter fomentation if the moisture from the preceding one is wiped off.

7. To change the fomentation: Have another rolled and ready to apply. Then put the hot fomentation, ready to unroll, in place as the old one is taken off. When the fomentations are finished, wipe off the area with a cold wet towel; then dry. Three fomentations are called a set. More may be given if necessary to relieve pain.



of pain, as soon as it becomes comfortable. If unbearably hot, rub with the hand the part under the fomentation, or remove the moisture by firm rubbing once or twice with a Turkish towel wrapped about the hand. The fomentations may be applied over a towel in order to temper the heat. Always be careful to protect from chilling the area being treated, by keeping it covered with the fomentation cloth or a towel.

To renew the fomentation, prepare another similar one, and apply immediately after removing the moisture occasioned by the first. Never apply another fomentation until this is done, as the water on the skin makes it more difficult to endure the heat of the newly prepared fomentation. The second fomentation should be ready to apply before the first is removed. The removal of the inside cloth from the outer for purposes of renewal does not give the best results, although careful attention to details may still make the treatment very effective.

Unless otherwise indicated, three successive applications are made. In all cases, however, they should be continued until the desired effect is obtained. After the last one, the part should be immediately cooled by a wet hand rub, cold compress, or rub with a cold wet towel. Dry thoroughly, and cover at once to prevent chilling. In some cases of pain, the part should be dried without the cold applications. All changes should be made quickly, and the part treated should never be left uncovered.

Precautions: In cases of unconsciousness, paralyzed sensation, diabetes, or dropsy, great care must be taken to avoid burning. Each application should be tested by the back of the hand or by the face before being applied to the patient. In fomentations to the face or other sensitive part, gauze should be placed next to the skin.

In case of general perspiration, a general cold friction, a wet hand rub, a wet towel rub, or an alcohol rub should be given.

Sensitive surfaces, especially bony prominences, such as the hip bones, the edge of the ribs, the collar bone, or the shoulder blade, may need to be protected by extra coverings of flannel or Turkish towel.

When the patient is liable to congestion, and always in case of fever, apply cold compresses to the head, and also to the neck if needed. The same should be done where two or more different applications of heat are made at the same time, or general perspiration is induced. In heart disease, usually in fever, and with rapid pulse from any cause, an ice bag should be placed over the heart.

In order to relieve pain, the fomentation must be very hot, as hot as can be borne, and renewed as soon as it becomes com-

fortable. In some cases of pain, the cold application at the close should be omitted, the part being dried and immediately covered with flannel or other dry covering.

Effects: A test of the efficacy of such a treatment is the redness of the skin after removal of the fomentation. The fomentation is used to relieve pain, remove congestion, or as a preparation for cold treatment. Applied to the throat and the upper chest, it helps in relieving sore throat, tonsillitis, cough, bronchitis, and lung congestions. When applied to the throat only, it should be folded so as to be about eight or ten inches wide, and as long as the full length of the cloth. To protect the lower part of the face, a towel may be placed across the neck, under the fomentation, which should be tucked close up below the ears. For the chest only, the fomentation should be folded nearly square, and as large as possible. For pleurisy, it should be applied to the chest under the arm of the affected side, from breastbone to spine; for the kidneys and for lumbago, across the small of the back. For the spine, it should be long and narrow—about six inches wide. Fomentations to the spine help to promote sleep, and for this purpose should be only moderately hot. For a joint, as the knee, the cloth may be folded as for the spine; and being drawn under the knee, the two ends are wrapped about the front of the knee, one above the other.

Where a patient must apply his own fomentations, it may be best to use a hot water bottle placed over a wet compress, first covered with one piece of flannel so as to retain the accumulated heat. This is not as efficient as a properly applied fomentation, but trying to be both patient and nurse is never wholly satisfactory.

For such parts as the eye, a wound, or an infected part, hot compresses of cotton cloth, gauze, or cheesecloth are better than wool. Because they will usually be smaller, and because they are of cotton, the heat is not retained as long as with wool, and so they must be changed oftener.

Stupe. A stupe is a medicated fomentation. Turpentine, mustard, menthol, *et cetera*, are sometimes applied in this way. Since these substances, applied under a fomentation, are very liable to produce a blister and so prevent the use of further treatment, they are not to be recommended unless very carefully given. To prepare a mustard stupe, wring a gauze or muslin compress from a cup of hot water containing one teaspoonful of mustard. Spread this out on the surface to be treated, and cover with an ordinary fomentation, which must not, however, be very hot.

Revulsive Compress. This is given in the same manner as the fomentation, with the addition of a cold compress after each

application of heat. A hand towel is wrung from cold water or ice water, and spread out over the surface immediately on the removal of the fomentation. It is pressed firmly against the skin, turned over, again pressed firmly against the skin, and removed. The surface is then dried with a towel, and the next fomentation applied, which should have been prepared and ready before the first fomentation was removed. A smooth piece of ice may be rubbed over the skin after each fomentation, instead of the cold compress. This is usually spoken of as *alternate hot and cold*. Alternate hot and cold to the spine is often used as a stimulant and tonic. To the chest, the abdomen, the neck, or a joint, the revulsive compress is better, and is used in colds, bronchitis, and similar ailments, after the acute stage is past. To the abdomen, it is useful in stimulating the flow of digestive juices and the movements of stomach and bowels.

COLD COMPRESSES

A cold compress is a local application of cold by means of a cloth wrung from cold water. Hand towels or ordinary cotton cloths may be used. These should be folded to the desired size, and wrung from cold water or ice water. The wringing should be just sufficient to prevent dripping. They will be colder if taken immediately from a block of ice. As a continuous cold application, the compress must be very frequently renewed, always before it is warmed to any great extent. The thicker the compress, the less frequently will it require renewal. A set of two compresses should be used, and renewed at intervals of from one to five minutes, depending on the thickness of the compress and the result to be obtained. Cold compresses may be applied to the head, the neck, over the heart or the lungs, to the abdomen, the spine, *et cetera*. When applied to the head, they should be pressed down firmly on the surface treated, especially over the forehead and the temporal arteries. The pillow should be protected by rubber cloth covered by a towel. When compresses are applied to the abdomen in typhoid fever, the bedding and the patient's garments should be protected by Turkish towels. Unless the compress is very thick, and always when it is left longer than three to five minutes, the nature of the application changes, and it becomes a *heating compress*.

ICE BAGS AND CAPS

Ice bags are made in various shapes and sizes. The best are made of pure gum rubber, and are usually elliptical in shape. They may be obtained in almost any size desired. The spinal ice bag is about three inches wide by seven to nine or ten long.

Most ice caps are round or elliptical and provided with a screw cap. Some are also made with loops for holding them in place. Cloth-covered ice bags offer no advantage. They generally leak after being used a few times, and are unsanitary. The ice bag or cap should be filled with finely cracked or pounded ice, never with large chunks. In the case of the ice bag, the neck should be doubled down, then folded several times across this, and tied with tape one fourth inch wide. Thread or fine twine should not be used, as it cuts the rubber. When applying the bag, wrap it in a towel or one thickness of flannel. The skin should not be severely chilled. The bag should be removed often enough to prevent this, and the part rubbed briskly with the hand until warmed, or a fomentation applied for a short time.

HEATING COMPRESSES

A heating compress is a cold compress so covered that warming up soon occurs. The effect is therefore that of a mild application of moist heat.

A heating pack or compress consists of an application of heat to the body by means of three or four thicknesses of gauze or one of linen or cotton cloth wrung from cold water, and so perfectly covered with dry flannel, or mackintosh and flannel, as to prevent the circulation of air and cause an accumulation of body heat. In case warming does not occur promptly, it should be aided by hot water bottles. It is usually left in place for several hours, between other treatments, or overnight. If left on overnight, it should be dry by morning, unless an impervious covering, such as mackintosh or oiled silk, is used. On removal of the compress, the part should be rubbed with cold water, and dried with a towel.

The more commonly used heating compresses are the throat compress, the moist chest pack, the moist abdominal bandage, and joint compresses.

The Moist Chest Pack. Any kind of jacket that combines the above requisites for a heating compress with ease and neatness of application and accuracy of fit, will answer the purpose of a chest pack.

The square chest pack is perhaps the best for home use. The inside part may consist of three or four thicknesses of cheese-cloth, or one of thin linen. The outer part should be of thick flannel. Both parts of the pack are of an oblong form, wide enough to reach from the top of the shoulder to the lower ribs, and long enough to give a double thickness in front. The ends of the bandage are slit into two strips, one third and two thirds, respectively, of the total width, and each one third of the length.

The outer flannel part should be about two inches wider, and of the same length, and slit in the same fashion. The flannel part should be spread out on the bed, and the linen over it after being wrung from cold water. The patient then lies back on this. The narrow strips are brought over the shoulder and across the chest. The top of the wider strips should fit under the arms, and be brought across the chest. The flannel should be applied in the same manner, and at all loose places, be drawn tight or folded in, and the whole fastened with safety pins.

A home substitute may be made of an old pair of woolen drawers for the outer flannel part, and a thin cotton undergarment for the inside wet part, or an inner part may be cut from an old sheet so as to be about the same shape as the drawers but a little narrower. With the drawers held upside down, the body part is placed across the chest, and the legs are carried up over the shoulders, crossing each other between the shoulders, and then under the arms, and across the front of the chest over the body part of the drawers, or at its lower edge, and pinned under the arms to the part covering the back. The wet part is of course applied first. See that the flannel well covers the wet part on all edges, and pin snugly in place. To retain the moisture and so give greater sweating effects, the wet cloth may be covered with gossamer cloth, or oiled silk, of the same size and shape. The flannel is applied over this. When so covered, it is called a *protected chest pack*.

It is often desirable to apply the moist cloth to only a portion of the chest. The gauze or linen may be cut to any desired shape and size, and applied to the proper area under the square flannel pack. The chest being covered principally by dry flannel, this form approaches in effect the dry pack.

Dry Chest Pack. In the dry chest pack, only the flannel is used. It should usually be applied over a thin undergarment. The dry chest pack is desirable in thin persons, the aged, and those having insufficient body heat to warm up the wet pack. In the case of a thin person, it is often difficult, not to say impossible, to pin the wet pack so tightly as to prevent the air from circulating under the edges of the pack, and yet loose enough to be comfortable and not restrict the breathing. In many cases, a chamois vest may be worn over a thin undergarment, to produce the effects of a dry pack. The commonly used pneumonia jacket made of absorbent cotton wrapped in gauze or of similar construction is one form of the dry pack.

Chest packs are of much benefit in pleurisy, pneumonia, colds, influenza of the respiratory type, during convalescence from pneumonia, in asthma, in whooping cough, croup, *et cetera*.

Under the pack, the skin should be warm and gently perspiring. The choice of a dry or a moist pack will depend upon the vitality of the patient and the result to be obtained.

Moist Abdominal Bandage. The moist abdominal girdle is one of the most useful of the heating compresses. The inside part of the girdle consists of one thickness of linen or three or four of gauze, eight or nine inches wide and a little more than one and one half times the circumference of the body. The outer flannel girdle should be about twelve inches wide and of the same length as the inside part. The dry flannel is placed across the bed, and the gauze, wrung nearly dry from cold water, placed over it. The patient now lies back on the bandage so that the lower edge will be below the upper edge of the hip bones. Each end of the wet linen or gauze is pulled tightly across the abdomen and tucked under the opposite side. Both ends of the flannel are folded tightly over these and securely fastened with safety pins. Darts may be taken on each side by means of safety pins. The flannel piece should project one and one half or two inches above and below the wet gauze or linen. Where the patient's body heat does not easily warm up the bandage, it may be moistened over the abdomen only.

The moisture may be retained by a bandage of oiled silk or mackintosh of the same width as the linen, and applied between it and the flannel. This is termed a *protected girdle*. The sweating underneath will be more profuse than without the impervious covering. Since the moisture is retained, the girdle will not be dry by morning. The protected girdle is used in hyperacidity of the stomach, and in certain forms of constipation.

The ordinary moist abdominal bandage is useful in nearly all forms of indigestion, in neurasthenia, insomnia, catarrhal jaundice, constipation, and numerous other maladies. In these conditions, it is usually worn at night only.

Heating Throat Compress. Four to six thicknesses of cheesecloth, or two or three of other cotton cloth, about three inches wide, and long enough to encircle the neck twice, are used inside. Over this are wrapped two thicknesses of flannel not less than four inches wide. This compress being small, considerable water may be left in it, and still it be found dry by morning. The neck should be rubbed with cold water immediately after the removal of the compress in the morning. The "cold cloth around the neck" is a very common household remedy for such ailments as sore throat, hoarseness, and tonsillitis. It is indeed a very efficient measure. Its usefulness can hardly be overestimated. The heating throat compress is indicated in pharyngitis, acute laryngitis, tonsillitis, and quinsy. It is also useful in clergyman's sore

throat. In tonsillitis and quinsy, the compress should extend upward about the lower part of the ears, and may be held in place by a bandage over the top of the head.

Heating Joint Compress. Heating compresses may be applied to the foot, the ankle, the knee, the hand, the wrist, *et cetera*. Rarely more than two thicknesses of gauze are used. It is often necessary to use cotton for a covering to obtain close application to the skin surface. This may be held in place by a three-inch roller bandage or a broad flannel cloth. A dry pack may be made of cotton or soft flannel alone. In certain cases, the joints may be rubbed with a medicated solution before being covered, or the gauze dipped in it. In rheumatic fever, the joints may be rubbed with oil of wintergreen before the heating compress is applied. It helps to relieve the pain; and by its action as a counterirritant, the heating and circulatory effects are enhanced.

Medicated Compresses. Not only may the parts be rubbed with a medicament, such as turpentine, camphorated oil, oil of eucalyptus, or oil of wintergreen, before the heating compress or pack is applied, but the gauze may be wrung from any one of various solutions, such as an alcoholic solution of menthol, mustard water, watery solution of bicarbonate of soda, or salt-peter. When counterirritant drugs are used, the effect of the heating compress is intensified. It is usually not desirable to produce a blister. For this reason, the use of coal oil and turpentine should be discouraged. Not only may they produce blisters, but being inflammable, they are also dangerous.

Poultices. Poultices are very popular substitutes for the heating compress, and have a similar effect. They consist of a mixture of different substances, having the consistency of mush, and must be applied hot to produce the desired result. Flaxseed and onions are commonly used. The preparation may be applied directly to the skin, or spread on a cloth and bound tightly to the part. Poultices are often disagreeable, not to say uncleanly.

Probably the most useful poultice is that consisting of *white clay and glycerin*, sold under various names. It is applied hot about one eighth to one quarter inch thick, and covered with cotton and a bandage. The results are partly due to the heat and partly to the water-absorbing properties of glycerin.

The *charcoal* poultice is especially valuable in foul, sloughing ulcers or wounds. It may be prepared of charcoal alone, or by adding equal parts of flaxseed meal and powdered charcoal to boiling water until the resulting mixture is the consistency of mush. This is evenly spread on a cloth and applied to the part, or put directly on the part, and covered with a muslin cloth, and some impervious cloth, as oiled silk.

TONIC FRICTION

Cold Mitten Friction.

Requisites: A bowl or pail of cold water at 50° or 60° F. or ice water, a sheet, three Turkish towels, two friction mitts made of such coarse material as woolen moreen, and compresses for the head and the neck.

Procedure: The patient should be warmly covered and the feet warm; if not, give a hot foot bath. Bare one part of the body at a time. Do not expose any part longer than necessary; dry quickly and thoroughly, and cover at once with warm, dry covering. Before beginning the regular part of the treatment, bathe the patient's face and neck with cold water, or apply cold compresses to the head and the neck. This is especially necessary in treating patients with valvular heart disease. In this condition, an ice bag should be placed over the heart before the treatment is begun. In other conditions, it is not usually necessary.

Beginning with the right arm, place one towel under the arm, and another around the shoulder, to protect the bed and the patient. With the mitts on the hands, dip them into cold water, and shake or squeeze out the excess of water. While the patient holds the arm at an angle of forty-five degrees, rub the arm and the hand with rapid to-and-fro friction movements until it is in a glow. Quickly remove the mitts, dropping them into the bowl, and cover the entire arm with one of the Turkish towels, steadying the arm by grasping the patient's hand under the operator's arm. Dry by friction outside the towel, and then rub with the towel until the arm is thoroughly dry and well reddened. Treat the left arm in the same manner.

Now covering the rest of the body, bare the chest and the abdomen. Tuck a Turkish towel snugly under each side along the trunk and over the arms. Rub the chest with the mitten dipped in cold water, in a manner similar to the arms. Then cover the entire chest with one of the towels, and have the patient catch the two upper corners as they lie next to the shoulders. Rub briskly with downward strokes over the towel. Then wrapping the towel neatly about the right hand, again rub the entire surface, around the shoulders, and down the sides, so as to dry all parts that have been wet.

Cover the chest, and expose the right leg and thigh. Bend the leg, and place a Turkish towel under. Place another towel around the upper thigh at the groin. Begin the friction with the leg and the foot. Dip the mitts again for the thigh. Treat in like manner the left leg and thigh.

Have the patient turn over and lie on a pillow placed under the chest. Treat the back in the same manner as the front of the trunk. To dry, cover the entire back with a Turkish towel, and have the patient hold the upper end the same as for the chest; rub with downward strokes over the towel, then wrap the towel about the hand, and rub the surface again until thoroughly dry.

To vary the severity and the tonic effects, the temperature of the water may be changed, more may be left in the mitts, or the mitts may be dipped two or three times in treating each part, or the friction may be given more vigorously.

Wet Hand Rub. The same order and general procedure is followed as for the cold mitten friction. Bare one part at a time, rub with the hand dipped in cold water, following with percussion, then dry, finishing with brisk rubbing with the dry towel and the hands. Dipping from two to four or more times increases the tonic effect.

Cold Towel Rub. In giving the cold towel rub, a plain hand towel is used instead of the mitts employed for the cold mitten friction. The same order is followed as in the two previous treatments, beginning with the arms, then the chest and the abdomen, the legs, and last, the back.

The arm is held vertically, with the palm toward the feet. The towel is dipped in cold water and wrung lightly, quickly unfolded, and wrapped lengthwise around the arm, the upper corners being turned into the palm to be grasped by the hand of the patient. The part is then rubbed with to-and-fro movements outside the towel. Percussion may also be given, to insure greater reaction. The towel is now removed, and the arm dried as after the cold mitten friction.

When the chest and the abdomen are treated, the wet towel is spread out over the entire surface, and the patient grasps the upper corners next the shoulders, and holds tightly while the operator rubs with downward strokes outside the towel. The other parts are treated in a similar manner.

It should be remembered that the cold towel rub takes more heat from the body than the cold mitten friction, and it therefore requires greater reactive ability on the part of the patient. Because it does abstract considerable heat from the body, it is often used in fever. By dipping the towel twice or more for a single part, its fever-lowering effects are increased.

Salt Glow. Prepare about two pounds of coarse salt wet with cold water. The treatment should be given in a bathtub. The patient sits or stands with the feet in hot water. While standing at the side of the patient, begin with one arm. Wet the

entire skin surface of the shoulder, the arm, and the hand with hot water from the foot tub. This is done by dipping the water with the hands. Next apply the wet salt, spreading it evenly over the skin. Now with one hand on each side of the arm, rub vigorously with to-and-fro movements, until the skin is in a glow. Stepping behind the patient to the opposite side, proceed in the same manner with the other arm.

Retain the last position to treat the front and back of the trunk. With one hand in front and one behind, wet the skin surface with hot water from the foot tub. Now spread the salt as before, and rub the entire skin surface of the chest, the abdomen, the shoulders, the back, and the buttocks. Stepping behind the patient, with one hand under each arm, treat the sides of the chest, the abdomen, and the hips.

Next proceed with the legs in like manner.

Finish the treatment by thoroughly washing off the salt. This may be done by a pail pour of warm and then cool water, or immersion in a tub of warm water followed by a pour of cool water. Dry the patient with sheets, towels, and fanning with a dry sheet as after any general wet treatment.

The salt glow is a vigorous circulatory stimulant. Since no great amount of cold water is applied to the body, it does not require great reactive ability.

The cold mitten friction, the wet hand rub; the cold towel rub, and the salt glow are called *tonic frictions*, since they produce a marked circulatory reaction, and to a considerable extent the effects are due to the vigorous friction used.

SPONGING

Sponging consists of the application of a liquid by means of a sponge, a wash cloth, or the bare hand, in which the chief effect is derived from the liquid itself, little friction being needed.

Plain hot or cold water, or water containing salt or soda, vinegar and salt, or alcohol or witch-hazel may be used. The order of treating the various parts of the body should be the same as with the cold mitten friction.

In using cold water to reduce fever, a wash cloth or a sea sponge should be used. It is squeezed out only enough to prevent much dripping, and considerable time is spent on each part of the body, going back and forth over the part until it is perceptibly cooler. Each part is dried lightly without rubbing. Hot sponging is used in fevers where there is chilliness, the same methods being followed as with cold sponging. In sponging with weak salt water, soda solution, vinegar and salt, and in applying alcohol or witch-hazel, the bare hand is best.

To prepare the water for a *saline sponge*, dissolve about four ounces of common salt in a basin or bowl of tepid or cool water. It is a mild tonic and circulatory stimulant for anæmic or weak patients.

For the *alkaline sponge*, put two ounces of sodium bicarbonate (baking soda) into a basin of cool water. It is useful in itching and in hives. It need be applied only to the affected part.

The *vinegar and salt rub* is useful in checking the night sweats of tuberculosis. Prepare a half pint of equal parts of vinegar and water, to which add one or two tablespoonfuls of salt. Apply principally to the parts that perspire the most.

The *alcohol rub* is a very popular means of finishing a sweating bath, or for quieting purposes at night. It may be used in place of a wet hand rub or cold mitten friction, though it is less effective than the latter. Use equal parts of grain alcohol and water. Wood alcohol is poisonous when applied to the skin, and should never be used.

The *witch-hazel rub* has about the same effect as the alcohol rub. It is used undiluted.

FOOT, LEG, AND ARM BATHS

Hot Foot Bath. The foot bath is one of the most useful measures in hydrotherapy. Its chief use is as a preliminary or adjunct to other treatment. It may be given with the patient lying or sitting. Large pails may be used, but more conveniently, tubs of an elliptical shape about sixteen inches long and eight to ten inches deep.

If the foot bath is given in bed, protect the bedding with an oilcloth or newspapers. Cover the patient with a blanket or a sheet, tucking this covering about the legs and the foot tub so as to prevent the circulation of air.

The water should rise above the ankles. The bath may be at a temperature of about 105° F., and should be gradually increased, as fast as can be borne, to a maximum of about 120° F. It may be continued from five minutes to half an hour. At the close, the feet should receive a pour or dash of cold water and be thoroughly dried.

It is often necessary to use the cold head compress if the bath is very hot, continued for a long time, or if given with the patient sitting up, and in all cases where there is a tendency to faintness.

Effects: The hot foot bath draws blood from all other parts, especially those which are congested. The cold pour given at the close helps to maintain the blood in the feet. It is sometimes desirable to use a *mustard foot bath*, in which case add three or four tablespoonfuls of mustard to the water.

Alternate Hot and Cold Foot Bath. Use two tubs of water deep enough to cover well the ankles, one as hot as can be borne (temperature gradually raised), and the other at 45° F. Immerse the feet in the hot water for two minutes, and in the cold fifteen to thirty seconds. Continue alternations for ten to fifteen minutes, wiping from the cold.

Effects: The alternate hot and cold foot bath produces powerful circulatory effects in the feet. For this reason, the lessening of congestion secured by its use is very decided and enduring.

It is especially useful in congestive headache, in which case a cold compress should be applied to the head, or to the head and the neck at the same time. It is also useful in treating infections of the foot.



Alternate Hot and Cold Leg Bath

Hot Leg Bath. For this provide a tub deep enough to immerse the legs to the knees. A five-gallon can makes a good substitute. Begin with the water at 103° F. and increase the temperature as rapidly as can be borne. Use cold compresses to the head and neck, renewing them very frequently. For sweating purposes, it may be combined with fomentations to the spine. A patient with fever should not take a sweat sitting up, as fainting is very likely

to occur. When a leg bath is used for sweating, finish the treatment with a cold mitten friction or a cold pail pour with rubbing.

Alternate Hot and Cold Leg Bath. Two deep tubs are used. Otherwise the method is the same as the alternate hot and cold foot bath. The treatment is of special use in dropsy due to heart disease, or disease of a vein, and for infections of the feet or legs. In such cases, the duration of the hot should be about two minutes and the cold twenty to thirty seconds. Five or six changes should be made.

When used for varicose veins and varicose ulcers, the duration of the hot should be from one half to one minute, and the cold

one to two minutes. It is necessary that the cold be two to three times as long as the hot, so as to shrink the veins.

Hot and Cold Arm Bath. To give hot and cold immersion to an infected hand or arm (blood poisoning), employ two pails or foot tubs,—one of the hottest water that can be borne, and the other of ice water with a block of ice in it. To the cold water may be added one fourth or one half dram of crystals of permanganate of potassium; and to the hot water, about five times this quantity of oxalic acid. Immerse the hand and the arm in hot water for one and one half to two minutes, then in the cold



Left: Washtub and foot tub arranged for sitz bath. Right: Patient taking sitz bath. Note the blanket about the patient, and the cold compress to the neck.

for fifteen to thirty seconds. Continue these alternations for twenty-five to forty minutes, finishing with the cold. Hot water should be added to the tub as fast as can be borne. The procedure should be repeated from one to four times daily as indicated. Other parts of the body, as the foot, may be treated in a similar manner. Massage must not be used in infected conditions.

SITZ BATHS

For the sitz bath, a porcelain sitz bath with special inlet and outlet is the most satisfactory. It may be installed in a home bathroom, and is a very serviceable appliance. An ordinary washtub with a washboard as a back rest is a good substitute.

In either case, a deep pail or foot tub is necessary for the hot foot bath, which must be given with every sitz bath. There should be also a basin of cold water and a hand towel to provide a cold compress for the head. Place a folded towel over the edge of the tub under the knees, and another towel at the back of the tub or over the washboard, to make the patient more comfortable.

Cold Rubbing Sitz Bath. Sufficient water should be used to cover the hips and come up on the abdomen. The temperature of the sitz bath should be 55° to 75° F.; and that of the foot bath, 105° to 110° F., or as hot as can be borne. Time, one to eight minutes. Rub the hips vigorously to promote reaction. Friction mitts may be used.

Effects: If of brief duration—two to four minutes—it greatly stimulates the pelvic circulation, and the musculature of the bowels, the bladder, and the uterus. When it is given with very cold water (55° to 65° F.) and vigorous friction, these effects are intensified. The cold rubbing sitz bath is very useful in constipation, with weak, relaxed bowel muscles; also in cases where the uterus (womb) remains large after childbirth, so that the patient flows frequently or profusely. For this purpose, it should be used daily, with vigorous rubbing; the temperature at first should be around 85° , and lowered 5° with each successive treatment, until a temperature of 55° is reached. To shrink piles, use a shallow cold sitz bath.

Hot Sitz Bath. Begin at a temperature of 105° F., and rapidly increase to 110° to 115° F.; foot bath, 110° to 118° F. The foot bath should be kept at least two or three degrees hotter than the sitz bath. Keep the head cool with cold compresses or ice compresses to head and neck. These must be changed every three minutes. The entire duration should be from three to eight or ten minutes. At the close, cool the bath slightly, or to a tepid temperature, for one or two minutes. If sweating has been produced, pour cold water over the shoulders and the chest.

Effects: The hot sitz bath is used to relieve painful menstruation, and pain in the pelvic organs from other causes, also to relieve painful urination or the pain of an inflamed rectum or bladder, or the pain of piles. For piles, it is better to finish with a prolonged shallow cold sitz. The hot sitz bath is also extremely useful in difficult urination in old men with a large prostate gland obstructing the outlet of the bladder. It may be taken once or twice a day with benefit. For this purpose, and for all other purposes except painful menstruation or painful urination, the hot sitz is best finished with a pour of very cold water to the hips (at back and sides) just as the patient rises

from the hot water. Finished in this way, it is called a *revulsive sitz bath*. It is much more useful than the plain hot sitz, and is especially useful in treating pelvic inflammation of all kinds after the first acute stage has been passed. In these cases, it should be preceded by a vaginal douche of two or three gallons of very hot water—temperature 110° to 125° F.

Hot Half Bath. This is a good home substitute for the hot sitz bath or the revulsive sitz bath. It is given in an ordinary bath tub with the patient sitting up. The temperature of the water, the duration, the use of cold compresses to head and neck, and the cold pail pour at the close, are the same as for the hot sitz and the revulsive sitz. The uses and effects also are the same.

FULL TUB BATHS

It is very desirable to have a tub five and a half feet long, or even six feet for men, so that the body may be completely immersed. With those who are very ill, air pillows and air rings or folded towels should be used under the head and the hips. It is especially important that the temperature of the water be tested with a bath thermometer.

Hot Tub Bath. Temperature, 100° to 106° F. Time, two to twenty minutes. Give cold water to drink freely. Keep the head cool. If necessary, apply an ice bag to the heart and one to the back of the neck. It is usually best to begin the bath at about 98°, gradually raising the temperature to the desired point. The treatment may be finished by cooling the bath, or by a cold pour or shower given immediately after the patient rises from the bath.

Effects: The effect varies according to the temperature and the duration of the bath. If it is much prolonged, or if the temperature is very high, profuse sweating is produced. The hot tub bath may be used as a preparation for cold treatment. A warm bath at 100° to 102° is very effective in relieving convulsions from whatever source, and is also beneficial in other diseases associated with rigidity of the muscles.

Neutral Bath. Temperature, 94° to 97° F. Time, fifteen minutes to three or four hours; usually twenty to thirty minutes. Wet the forehead and the face in cool water. Cool the bath two or three degrees just at the close. Dry the patient with a sheet directly from the bath. Use no percussion or unnecessary rubbing, as this destroys the quieting effect.

Effects: The neutral bath is given for sedative purposes. To accomplish this, it must have a relaxing effect, and so equalize the circulation as to reduce the amount of blood in the brain and

the spinal cord. Its temperature will therefore vary with the condition of the patient, especially as regards the skin temperature. The season of the year must also be taken into account. For these reasons, it may frequently be necessary to employ the upper limit of the neutral temperatures, or raise the bath to 98° or even 99°. The air of the bathroom should be warm; and if the bath is much prolonged, stretch a sheet over the tub. Generally the water should be cooled two or three degrees at the close, to prevent the slight sensation of chilliness that is likely to be produced by contact with the air on emerging from the bath. When used for insomnia, it should be given just previous to retiring.

The neutral bath is also useful in mania. For this purpose, it must be prolonged to twelve hours or more, the patient being taken out once or twice a day, the bowels attended to, and the skin oiled. Where prolonged like this, and where the patient is violent, a sheet should be used stretched across the tub for a hammock, and other sheets or canvas straps may be needed for purposes of restraint. This bath may be kept up for several days, and is much better than morphine in such cases.

Cold Bath. Temperature, 55° to 90° F. Time, from a plunge only, to twenty or more minutes, depending on the temperature and the effect desired. It is necessary to employ rubbing constantly or at frequent intervals. The patient's face should be bathed in cold water before he enters the bath, and it is imperative that the skin be warm before the bath is given.

Effects: When a cold bath is given to a patient with a normal temperature, and lasts for a few seconds or minutes only, the effect is that of a stimulant and a tonic. The *cold rubbing bath* is the most commonly employed method of treating typhoid fever in institutions where tubs are available and convenient to use. The strict Brand bath is too severe a measure for many patients.

Brand Bath. As advised by Brand for the treatment of typhoid fever, the procedure is as follows:

Temperature, 65° to 70° F. Bathe the face and the head in cold water or ice water. Lift the patient into the bath. Rub constantly to keep the blood in the skin. If chilling cannot be prevented by vigorous rubbing, the patient must be removed from the bath. Time, fifteen minutes. Repeat when the patient's temperature reaches 102.5° or 103° F.

Graduated Bath. The graduated bath is as efficient in lowering fever temperature when much prolonged, as the Brand bath, and is less objectionable to the patient. The patient should be made comfortable by an air pillow, and a hammock made by

tying a sheet across the tub, fastening the corners and sides underneath. Temperature: begin at 98° or above, depending on the height of the fever; that is, from three to five degrees lower than the mouth temperature. The skin must be warm to begin with. Apply cold compresses to the head. Gradually reduce the temperature of the bath to about 85° F. When it has been brought below 90° F., or if the patient feels chilly or shows goose flesh, he should be rubbed constantly to keep the blood in the skin, and thus prevent or overcome chilling. A spine bag filled with hot water may be laid along the spine for the same purpose. Both pulse and temperature should be closely watched during the bath. The temperature should be taken every twelve or fifteen minutes. On removal, immediately wrap the patient in a sheet, drying quickly; and if there is goose flesh or chilliness, rub briskly with the hands until the blood returns to the skin. If the patient's skin is very blue, put him into a hot blanket pack for a few minutes, and take him out with a cold mitten friction.

Effects: Tonic chiefly, or temperature lowering, according to the condition in which it is given.

Electric Tub Bath. In institutions, this is a very much used bath; but in the home, it is of limited value, and only faradic electricity is likely to be available. A large faradic battery may be used with one electrode dropped into the water at or near the head of the tub, and the other at the foot. The battery must not be turned on until the patient enters the bath. The strength of the current should be just sufficient to give a pleasing sensation. Duration, ten to fifteen minutes. Temperature, 94° to 98° F. See that the current is turned off before the patient steps out.

Precautions: Do not use galvanic electricity, or any electric appliance connected with a lighting system. These may be very dangerous. The faradic is harmless.

Effects: The faradic tub bath is a useful, quieting measure for insomnia, nervousness, *et cetera*. It is helpful as a general tonic in some cases of paralysis not so severe but that the patient may be up and about.

MEDICATED BATHS

Saline Bath. From three to five pounds of salt added to a tub of water at 90° to 94° F. makes a pleasing substitute for a *sea bath*. Rubbing the skin during the bath increases the tonic effect, and one may take it cooler than a neutral temperature. Duration, five to ten minutes.

Alkaline Bath. Add one half to one pound of baking soda to a tub of neutral or cool water. This bath relieves hives, itching, and similar conditions. Duration, ten to twenty minutes.

Nauheim Bath. The effervescent or artificial Nauheim bath is one in which water is charged with saline substances and carbon dioxide. Many different formulas are used to prepare such a bath. To produce the carbon dioxide in a bath, it is necessary that an acid come in contact with an alkaline carbonate, setting free the carbon dioxide. Various proprietary mixtures prepared in cakes are offered for use.

In using these, dissolve the common salt and the sodium bicarbonate in a tub of forty or fifty gallons of water. The bottom of the tub is then covered with rubber sheeting. On this rubber sheeting place the acid cakes. In about three minutes, when effervescence is well under way, the patient should lie down in the bath.

The following is a simple and inexpensive formula that is frequently employed:

Sodium chloride (common salt)	3-8 pounds
Sodium bicarbonate (baking soda)	$\frac{3}{4}$ -1 $\frac{1}{2}$ pounds
Hydrochloric acid (commercial muriatic) ...	$\frac{3}{4}$ pound

Dissolve the common salt and the baking soda in the tub of water. Dilute the muriatic acid with two or three times its volume of water. This may be done in a two-quart bottle—*never* in a metal dish. When the salt and the soda are thoroughly dissolved, open the bottle of acid under water, moving it about in the bottom of the tub to hasten the mixing. The bath is now ready to enter.

The temperature of the bath should range from 85° to 94° F. The lower temperatures and the larger amounts of salt and soda should be used for the later baths of a series. The duration of the bath should at first be from five to eight minutes. The time may then be gradually extended to fifteen minutes. A cold compress should be applied to the head, and an ice bag to the heart. The patient should not be rubbed during the bath. About three baths a week may be taken for three or four weeks. Not over twenty baths should constitute a course.

The Nauheim bath is used principally in heart disease, and is the most effective natural tonic to the blood vessels and the heart in this condition that is known. It should be used under the direction of a physician.

Russian, Turkish, and Electric Light Baths. Since these require expensive equipment, very few homes can be provided with them, though they are very useful and much used in institutions. The Russian bath is a steam or vapor bath, and the Turkish is a hot air bath. The electric light bath is given in an

upright or reclining cabinet fitted with mirrors and electric lights. All three are used for sweating purposes, and in cases of obesity, kidney disease, and a great variety of other conditions.

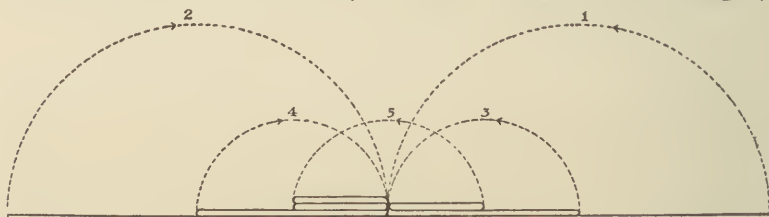
PACKS

Hot Blanket Packs.

Requisites: Two double blankets or one single and one double blanket; two hot water bottles half filled with hot water at 160° F.; a bowl or pail of ice water, with compresses for the head, the neck, and the heart; two Turkish towels; a tumbler, a drinking tube, and a pitcher of hot water for drinking.

Preliminaries: Move the bowels by an enema, give a hot foot bath, and have the patient drink hot water.

Procedure: Spread a double blanket on the treatment table or the bed. Adjust a cold compress to the patient's head while his feet are still in the hot foot bath. Fold the single blanket or another double blanket (the latter holds the heat longer)



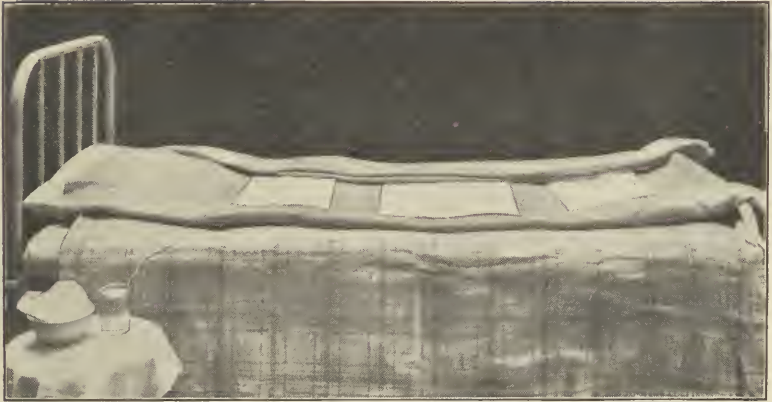
HOW TO FOLD A BLANKET

Spread the blanket out flat on the treatment table, then fold from each side toward the center in the order indicated by the numbers 1-5.

lengthwise in convenient width for wringing by hand. Wring from boiling water, and quickly unfold and spread out over the dry blanket on the table.

Place three towels over the wet blankets where the shoulders, the hips, and the heels will rest. Assist the patient to lie on the hot blanket, or if a bed patient, lift onto the blanket. As quickly as possible, or as rapidly as can be borne, envelop the entire body, except the head, in the hot blanket. Place one hot water bag between the legs, with one thickness of dry blanket between it and the moist blanket, and the other at the feet. Tuck both the wet and the dry blanket in well, especially at the feet and about the shoulders and neck, so as to exclude the air. See that the wet blanket comes in contact with the body over its entire surface, so that no air spaces will be left.

Place cold compresses to the head and the neck, and protect the chin from the hot blanket by a soft dry towel. Renew the compresses before they are warmed to any extent.



HOT BLANKET PACK

Hot wet blanket in position ready for patient. The three Turkish towels are to protect the bony prominences,—shoulders, hips, and heels. The dry blankets are placed first, then the hot wet blanket. Everything must be in readiness, and great speed practiced, that the blanket may not cool. Two persons can work to better advantage than one.



Enveloping the hot wet blanket with dry blankets. Three dry blankets are used, each blanket being wrapped separately, first one side, then the other, to exclude the air. Note the protected hot water bags placed next the hot blanket, to help retain the heat.

The patient should perspire in a short time. If perspiration does not begin in about ten minutes, give hot water to drink.

Continue the pack from twenty to thirty minutes; that is, until it ceases to have a heating effect. Take the patient out by



Hot blanket pack completed. A dry, fresh towel is placed over the blankets and tucked under the chin, to prevent irritation. Iced towels are placed on the head. Drinking hot water aids perspiration. The nurse must not leave the patient alone in a pack.



Removing a patient from a hot blanket pack. One portion of the body is exposed at a time, briskly rubbed with a towel or mitt dipped in ice water, dried, and covered with a Turkish towel; first the arms, then the chest and the abdomen together.

a cold mitten friction or a cold towel rub, removing the blanket from one part at a time, and covering with a dry blanket or bedding immediately after. It is usually most convenient to give



The same brisk rubbing is given to the legs. After they are dried, pull off all the wet and the dry part of the pack together.



Then roll the patient onto the dry protecting blanket that was placed over the bed in the beginning. Quickly fold the body in this blanket, and finish the cold friction by towel or mitt rub to the back.

the friction to the arms first, then to the chest and the abdomen, and to the legs last, giving the cold friction to the back after the blanket has been entirely removed.

Precautions: Too much water left in the pack makes it feel very hot at first, but it cools more rapidly than when wrung nearly dry. For this reason, the pack should be wrung as dry as possible.

If the hot water bags are too near the patient (not sufficiently covered), there is danger that burns will result. If complaint is made, the bags should at once be covered more thoroughly.

In some cases, it is necessary to use a cold compress or an ice bag to the heart.

General free perspiration should be induced by the pack. Long continued heat without perspiration results in harm.

Effects: The hot blanket pack is a vigorous sweating measure, and is especially useful in uræmic poisoning, in convulsions of pregnancy (eclampsia), and in acute Bright's disease. In all these, usually the pack should be preceded by an enema of one pint of water containing a teaspoonful of baking soda. This is to be retained and absorbed. During the pack or just before, a glass or two of plain lemonade or lemonade containing a teaspoonful of baking soda should be given. These help to start or increase kidney action.

The hot blanket pack is very useful in relieving the pain of gallstones or kidney stone colic. Much less morphine will be required, or even none at all in some cases. For this purpose, the pack may be applied to the trunk only—*hot trunk pack*.

Hot Leg Pack. This is prepared in the same way as the full hot pack, including the feet, and the legs to the hips. It is more conveniently applied than the hip and leg pack, and a fomentation may be applied to the lower abdomen and the hips so as to cover nearly the same area. The leg pack is very useful in relieving congestions and inflammations in the pelvic organs. It may also be used in pneumonia, and is helpful in relieving the pain of appendicitis, in which case, and with acute pelvic inflammations, an ice bag should be placed over the affected organ. The treatment is continued about thirty minutes, and concluded with a cold mitten friction.

Wet Sheet Pack.

Requisites: Two blankets, a sheet, a large hand towel, a Turkish towel, a pail of water at 60° to 70° F., and a hot water bottle.

Preliminaries: The feet and the entire body must be warm before the pack is applied. In case the skin is not warm, a hot blanket pack or some other general hot treatment should be given. The head should be cooled by cold compresses before the patient enters the pack.

Procedure: Place a double blanket lengthwise of the bed, with the edge opposite the attendant hanging farther over the edge of the bed than the near edge. The upper end should be about eight inches from the head of the bed, and cover the lower third of the pillow. Wring the sheet as dry as possible from cold water, and spread out upon the blanket, so that its upper end will be a little below the upper end of the blanket. The patient then lies down upon the wet sheet, with the shoulders three or four inches below the upper edge. Both arms should be raised, while one side of the sheet is quickly wrapped around the body, drawn tightly in contact at all places, and the edge tucked under the opposite side. Below the hips, the sheet is wrapped around the leg of the same side. The arms are then lowered, and the opposite side of the sheet is drawn tightly over the body and tucked in. The sheet is folded over the shoulders and across the neck. The narrower edge of the blanket is drawn tightly around the body and tucked in along the side. The wider edge is disposed of in a similar manner, being pulled tightly to bring all parts in close contact, and the extra amount is wrapped entirely around the patient. The foot end is doubled under the feet. A Turkish towel is placed about the neck, to protect the face and the neck from contact with the blanket, and to exclude the air more perfectly. An additional blanket may be laid over the patient and tucked in along the sides and about the feet, or two blankets may be placed on the table at first.

Precautions: The wet sheet must come in close contact with the body at all points. The dry blanket must effectually prevent the entrance of air; otherwise chilling will result. "Warming up" should occur promptly. The feet must be kept warm during the entire treatment. It is permissible to place a hot water bottle to the feet to hasten reaction in case this is delayed.

Effects: The wet sheet pack is used principally for two purposes. In fevers such as typhoid, the outer blanket covers are removed entirely, or kept over the feet or legs only, and the wet part is renewed by sprinkling on more cold water, and evaporation and cooling are hastened by fanning, if necessary. Used in this way, it lowers the temperature in fevers, and may be called an *evaporating or cooling wet sheet pack*.

The other principal use is as a quieting agent in mania and to produce sleep in insomnia. For either of these purposes, by means of more or less covering, the pack is kept just comfortably warm. This is called a *neutral pack*, and may be prolonged for hours at a time.

If the pack is removed before sleep is produced, uncover one part at a time, drying thoroughly, and wrapping in a warm dry

sheet; or entirely remove the pack, and immediately wrap the patient in a warmed sheet, finishing the drying as quickly as possible.

If the pack is removed after the patient has slept, conclude the treatment by a wet hand rub or a cold mitten friction, according to the degree of tonic effect desired.

The wet sheet pack prolonged to the *sweating stage* is very useful in the transient fevers of infants and children.

Heating Trunk Pack with Hot Water Bottle. A single blanket is placed crosswise of the bed so that the upper edge may reach well up under the arms. A sheet doubled (in case of feeble patients, a single thickness) to a width that will reach from the armpits to below the hips is wrung from cold water and placed over the blanket. The patient lies down on this, and while both arms are raised, one end of the wet sheet is pulled tightly across and around the trunk. Over the abdomen, outside of the sheet, place a three-quart hot water bottle half filled with water at 130° F. Wrap the other end of the sheet about the trunk, over the hot water bottle, and cover snugly with a dry blanket, folding over one end at a time. Continue the treatment from forty minutes to two or three hours. It may be begun half an hour before the meal. General sweating should not be produced. Take the patient out with a cold mitten friction.

This treatment is a most useful one in all kinds of digestive disturbances associated with slow or painful digestion, or with gas formation or vomiting. It is also of great benefit in the pernicious vomiting of pregnancy. In severe cases of vomiting, the pack should be applied about twenty minutes before the meal, and continued for two or three hours after the meal.

SPRAYS AND DOUCHES

In sanitariums and other well equipped institutions for the treatment of the sick, various forms of apparatus are used for the control of hot and cold water under pressure. By means of these, the patient may have general hot, cold, graduated, or alternate hot and cold needle sprays or showers. Besides these general treatments, localized areas of the body, as liver, spine, chest, or feet and legs, may be treated by a jet or stream of water under pressure, or by a sort of sprinkler or rosette spray of hot or cold, or alternate hot and cold water. These treatments are extremely useful, and constitute one of the great advantages of institutional care of the sick. They can of course be used to only a limited extent in the ordinary home.

Massage, Electrotherapy, Phototherapy, Radiotherapy

MASSAGE

Massage consists of systematic friction and other manipulations of the skin and the deeper tissues. Our very instinct seems to teach us the value of rubbing in the relief of pain. Who has not witnessed the soothing effect of a mother's tender touch and gentle pressure and stroking upon a child suffering from a bruised head or other hurt? Massage, whether crude or scientific, is as old a remedy for aches and pains as hydrotherapy.

Physiological Effects. In massage skillfully administered, we find one of the most powerful remedies for a large number of disorders. But when given ignorantly or indifferently, it may do harm. Manipulations of the skin and muscles increase the local circulation, and thereby improve nutrition, and also favor healing in the case of a wound. The effects are both local and general. The lungs are stimulated, digestion is facilitated, and the eliminative organs act more freely. Massage gently given soothes the nerves and promotes sleep. Given more vigorously, it produces many of the beneficial effects of muscular activity, although in a smaller degree, and it has been described as a mild form of vicarious exercise.

Massage in the Home. While massage is a treatment that requires many months of careful teaching and training to acquire, there are nevertheless a few manipulations, such as stroking and muscle kneading, which an intelligent person ought to be able to learn from a textbook so as to give a rubbing that will at least do no harm, but, in the majority of cases, aid in the patient's recovery. Either a bed or a lounge may be used for the patient, who, if the massage is a general one, should be undressed. Massage can be given over the clothing, but not so efficiently. In the case of the head or a limb, the patient may sit or lie down, as desired.

The masseur should wash his hands before giving the treatment; and the nails should be short, to prevent scratching.

A very little oil, such as cacao butter, or talcum powder may be used in giving the massage, but neither is necessary unless the skin is very dry and broken.

The treatment of a limb or other part of the body lasts from ten to fifteen minutes, and a complete massage forty minutes.

It is not wise to tire the patient by too vigorous or too long a treatment.

The Patient. The comfort and welfare of the patient must receive first consideration, and care should be taken to leave him in a calm, restful state after the treatment. Massage should be light to begin with, and gradually increased in vigor as the patient gains strength and can bear it.

Massage of the head, chest, back, and limbs may be given at any convenient time, but abdominal massage should be avoided immediately after meals. A massage of the head or spine should be given after all preparations have been made for the night, so that the patient is ready to go to sleep. The kneading should be light and the stroking gentle and soothing, in order to leave the patient asleep if possible.

The Movements. The procedures or manipulations of massage may be classified briefly as follows:

- | | |
|----------------|--------------------|
| 1. Touch | 4. Kneading |
| 2. Compression | 5. Percussion |
| 3. Stroking | 6. Joint movements |

Before beginning the massage, have the patient take ten to twelve deep breaths of fresh air. Then see that he is in a comfortable position, with muscles and nerves relaxed, and just sufficient covering to keep him warm. Only a small part of the body need be exposed at a time.

Touch. The subtle influence of a warm, gentle touch upon the nervous system is difficult to explain. The fingers or an entire hand or both hands are laid lightly and softly upon the part to be treated. The procedure is purely passive, and as gentle as possible, without any pressure.

Touch often relieves certain forms of nerve irritation and even pain. The tender touch of a sympathetic hand upon the forehead is sometimes used for inducing sleep. The soothing touch of a skillful nurse helps to inspire confidence and promotes healing.

Compression. Touch combined with pressure is a more efficient remedy for pains and aches. The compression may be light or heavy. Numbness, tinglings, creepy sensations, and various nerve irritations, as well as congestions and swellings, often yield to compression. An expert masseur can sometimes induce sleep by this treatment.

Pressure applied to the nerves is called nerve compression. A knowledge of anatomy is essential for successful nerve compression, and this treatment is usually given by the attending

physician. Light nerve pressure stimulates, while heavy pressure soothes and numbs, thus relieving pain.

Stroking. Touch combined with movement constitutes stroking. The movement is a gliding one, with variable pressure and rapidity, according to the demands of the case. It is given in one direction only, and that is toward the heart. The movement is rather slow and the pressure light as a rule.

To stroke the head, begin at the middle of the forehead and move backward, and then from the crown stroke downward.

The face is stroked from the middle line downward and outward.

Stroke the back downward and from the middle line outward.

Stroke the chest from the sides inward to the breastbone, following the ribs.

The stroking of the abdomen is more complicated, but all that need be attempted by the amateur is to follow the course of the colon, from below upward on the right side, across from right to left above the navel, then down the left side, and across to the right side, this time below the navel.

The limbs are stroked from the extremities toward the trunk, and the feet from the toes to the heels.

Done skillfully, stroking is a most calming and quieting treatment. Applied to the head, it drives away nervous headaches, and brings a feeling of restfulness, and sometimes sleep. Neuralgie as well as other pains are relieved by stroking.

When stroking, keep the fingers extended and close together, and use both fingers and palms for the movement.

Kneading. Deep massage, known as kneading, consists essentially of a manipulation of the muscles and deeper structures. It is interesting to know that the word "massage" is derived from the Greek, and means *to knead*.

With the thumb and the fingers, grasp the skin and the deeper tissues, and compress them with the degree of firmness or vigor suitable in the case. The movement is really a squeezing and compression of both the skin, and the underlying muscles that can be reached.

The kneading may be superficial when only the skin and the adjoining structures other than the muscles are involved. This is known as pinching, a treatment that was administered daily to Julius Cæsar for neuralgia. The compression is firm but not violent. The first finger alone or both the first and the second finger may be used with the thumb for superficial kneading. Deep kneading is given more slowly. It is regarded as the most important and most powerful massage movement. Grasp the

superficial muscles, and knead them in much the same fashion as a baker kneads bread. All muscles within the reach of the thumb and fingers should be kneaded firmly and deliberately.

A good masseur is able to knead the stomach and the bowels as well as the abdominal muscles. But take care to avoid injuring these or other abdominal organs. The loosening and displacement of a kidney is not impossible if the movement is carelessly or too vigorously given.

Skillful kneading produces a tonic effect that is soon visible. This tonic effect varies with the strength of the kneading. With most patients, it must be given gently at first, and gradually increased in vigor as they are able to bear it. The circulation of both blood and lymph is accelerated in the part treated, and the stimulating effect reaches all organs and tissues through the nerves. The "tone" is improved, and both circulation and respiration are strengthened.

Kneading is an excellent means of developing muscle in the bedridden, and maintaining a healthy "tone" in the whole body. It is a very useful treatment for most forms of recent paralysis, and especially hemiplegia, or one-sided paralysis. Rheumatic pain, sprains, swollen joints, and chronic inflammations generally are benefited by kneading administered by a trained masseur.

Percussion. This is the most difficult of the movements, and requires considerable skill and practice to give correctly. With the fingers separated, strike the fleshy surface a smart blow with the outer (ulnar) surface of the little finger, and let each succeeding finger reinforce the blow. Percussion should be given rapidly and with considerable vigor, although not beyond the capacity of the patient to derive benefit from it. The blows vary in intensity, but are given quickly and lightly. The intensity of the treatment must be lightened in the case of thin, bony, or supersensitive patients. On the other hand, obese patients can take a vigorous percussion over the fleshy parts and benefit accordingly.

Finger tapping, the lightest form of percussion, is given with the balls of the fingers only. It is administered to the face and the head.

Spitting, slapping, clapping, and hacking are other forms of percussion that we need not describe in detail.

Percussion causes exciting and exhilarating effects, which enliven the entire body through the nervous system, and produce a fine tonic effect, which is most pleasant and equally beneficial.

Joint Movements. We ought to state that strictly speaking, massage does not include joint movements of any kind; but a little instruction as to what they are may prove acceptable.

Under certain conditions, there is a strong tendency for one or more joints to become stiff for want of use. Under such conditions, daily movement of the joint in normal directions is the only means of preventing a stiffness that might in time render the joint practically or completely immovable.

Active and passive movements of the joints are used in treating paralysis of different kinds. At first, the patient may not be able to move the joint at all, and then passive movements are given by the operator. But the patient should be instructed to attempt flexion and extension of the joint, even though he can produce no visible movement. To hasten progress, active movements are given, the patient bending the joint while the attendant resists, and then the extension follows under the same conditions. The resistance is slowly increased as the muscles gain strength.

Important Points. Massage or joint movements for the sick, except in perfectly obvious cases, should only be given under the direction of the doctor, for it is possible to do harm, especially in the case of an amateur.

Always give massage lightly at the outset. It is a

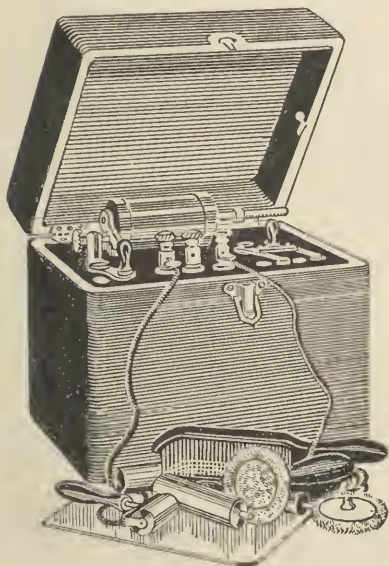
simple matter to increase in vigor as the patient becomes stronger.

With one or two exceptions, inunctions are practically valueless as far as the penetration of medicine is concerned. Mercurial compounds form the chief exception. It is the skillful rubbing that produces the good results, rather than the ointment.

Take care to keep the patient warm and comfortable during the treatment.

ELECTROTHERAPY

Electricity, one of the most powerful forces in nature, is another recognized remedy. In a well equipped sanitarium, provision is made for using various forms of electricity, such as the faradic, galvanic, sinusoidal, static, and high frequency currents, not to mention other more recent modalities. But for home use, we would recommend the faradic battery, an apparatus



A Faradic Battery

that can be obtained from any drug store or medical instrument dealer for ten to twenty dollars, according to size and quality. With the exception of the dry cell, which must be renewed from time to time, a good faradic battery, used with reasonable care and kept in a dry place, will last for years.

Faradism. Faradic electricity is probably the current most commonly used for medical purposes, and it is also the simplest to understand and control, and furthermore, it is by far the safest in the hands of an amateur.

In giving faradism, the direction of the current is of little importance, so one need not trouble about positive and negative poles. This is because it is an interrupted current, given off from what is known as the secondary coil, and the tonic results obtained depend on the passage of the electricity through the body rather than the direction it takes. This is not true of the galvanic or continuous current, the direction of which is of vital importance.

Strength and Duration of Current. The strength of the current to be used is determined by the sensitiveness of the patient. Some are extremely susceptible to electricity, while others have a much greater tolerance. Unless directed otherwise by the attending physician, give a current that can be borne with comfort. Always begin with a current that is barely felt, and gradually increase it to the proper degree of force. Before disconnecting, diminish the strength so as to avoid a shock, even though it might be a mild one.

The duration will of course vary somewhat with the nature of the complaint and the condition of the patient, but the usual time is from ten to twenty minutes.

* After the treatment, the patient should rest quietly for half an hour or more in order to receive full benefit.

The good results obtained from the medical use of electricity are various and depend on many factors. Ordinarily, electricity is regarded as a tonic and strengthener. After general faradization, there is usually a distinct feeling of gentle exhilaration and well-being. Most if not all of the numerous functions of the body are mildly stimulated. Muscles can be made to contract either by direct application of the electric current or through the nerves supplying them. Faradism can also be given so as to produce a soothing effect upon the nerves, and even to induce sleep, especially when given in a neutral bath. Pain may often be relieved by a skillfully applied faradic current.

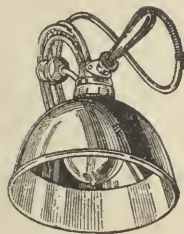
But these are only a very few of the beneficial effects obtained by the medical use of electricity.

PHOTOTHERAPY

The vital rôle that light and sunshine play in the maintenance of life has long been recognized, but the use of artificial sunshine in the form of electric light for the treatment of disease is a recent achievement. Nevertheless, phototherapy, or light treatment—for that is the meaning of the term—is already recognized as a very valuable remedy for almost all ailments.

Physiological Effects. We can only touch very briefly on the effects of light upon the body. The direct effect is of course upon the skin; and through the skin and its nerves, the influence reaches the deeper organs. The skin is gradually tanned, and

in time takes on a dark brown similar to the color of the hands of a lusty farmer. The duration of exposure must be short at first, and lengthened carefully, so as to prevent sunburn and blistering. Exposure to light, whether sun or electric, gives tone and strength to the skin, and also increases its activity. The patient, if subject to "colds," slowly acquires a greater degree of resistance to such attacks, and eventually, if in the same time he leads an increasingly active outdoor life, becomes immune to colds.



A Photophore

The heat combined with the light relieves pain and promotes the healing of all sorts of injuries. There is also a distinct germicidal effect; for artificial light, as well as sunlight, destroys germs.

The Photophore. Finsen of Copenhagen was the first to use the concentrated rays from an electric arc light to cure lupus (tuberculosis of the skin). Various other electric lamps have been used for this purpose and for the treatment of other skin diseases, with more or less success. The ordinary electric light is of little use in these conditions. The effects of the electric light bath are chiefly due to heat; the chemical effects are small.

The place of all these lights has been taken largely by the mercury vapor quartz lamp, the effects of which are highly beneficial in a number of skin diseases, and in such other conditions as neuritis and sciatica. All these appliances must be used by a physician, and so are not available for the home.

The direct sun bath is, however, a means that may be used by all if a suitable plan is followed and proper precautions are observed. It has been shown to be one of the most beneficial agencies known in the treatment of tuberculosis of bones, joints, glands, *et cetera*, and remarkable results have been attained. It may be best given at a high altitude, where the patient will be less likely to be overheated, and where the air is clear of smoke

and dust. At lower altitudes, in the hot summer months, it is better given during the early and the late hours, as the heat of the middle of the day is very depressing and is likely to cause a rise in temperature and such unpleasant symptoms as headache, nausea, and dizziness. It should be discontinued at least one half hour before meals, and should not be resumed until an hour or more after meals. Care must be taken that no breeze strikes the body. A slight breeze is sufficient to chill the patient, making the treatment dangerous. It is best to guard the head with a straw hat, an umbrella, or an awning. The eyes should be shielded with colored glasses or a dark cloth, or cold wet compresses may be used on the head and to cover the eyes.

A very important point in giving the sun bath is the exposure of the feet first, other parts being exposed gradually, until a full sun bath is taken. The diseased parts should be exposed last. The following plan is that recommended by a specialist in this line:

First day: The feet are exposed to the direct rays of the sun for five minutes, three or four times, at hour intervals.

Second day: The feet are exposed ten minutes, and the legs to the knees, and the arms to the elbows, five minutes, three or four times, at hour intervals.

Third day: The feet are rayed fifteen minutes, the legs to the knees, and the arms to the elbows, ten minutes, and the thighs and the upper arms five minutes, three or four times, at hour intervals.

Fourth day: The raying of the previously exposed parts is increased by five minutes, and the abdomen and the lower back are exposed five minutes, three or four times, at hour intervals.

Fifth day: Again the raying of the previously exposed parts is increased by five minutes each, and the chest and the back are exposed five minutes, three or four times, at hour intervals.

The time of exposure is increased daily by five minutes, until three or four hours of sun bath is given. If conditions prevent following this exact plan, a very similar one must be used, as care must be taken in the first browning of the skin. Discharging sores and ulcers should be covered with a wire screen, to keep off flies. When a full sun bath is taken, the only covering worn is a loin cloth. The skin may be rubbed with spirits of camphor.

RADIOTHERAPY

The development of radiotherapy within the past few years is little less than phenomenal. In the X ray, its discoverer, Röntgen, gave to the world a powerful and valuable remedy.

Röntgen Ray Examination. All that we can usefully attempt in these brief paragraphs is to point out some of the

advantages of X ray diagnosis and treatment. When, as the result of an accident, there is a suspicion of dislocation or fracture of a bone, an X ray examination is the most satisfactory method of settling the doubt. But it does much more, for it reveals with rare accuracy the exact position of the bones, whether broken or separated. This is of the greatest value to the surgeon, for it enables him to get the best results possible when repairing the injury.

An X ray examination is imperative whenever there is suspicion of stones in the bladder or the kidneys; but gallstones are not found by means of the X ray except in a small per cent of cases.

Ulcers, cancer, tumors, or stricture of the hollow organs, such as the esophagus, stomach, intestines, bladder, ureters, or kidneys, may be shown by the X ray when these organs are filled with some substance that casts a shadow under the ray.

The X ray is one of the most delicate means of recognizing the early stages of consumption of the lungs. With its aid, the doctor is able to measure accurately the size and position of the heart, and also observe its beating. He can study the alimentary tract, and watch the passage of food from the mouth to the rectum, by giving barium or bismuth in a pint of milk. This is perhaps the most important and exact means of gastric and intestinal diagnosis that we have.

We must remember that all these methods of X ray diagnosis, and many others which lack of space forbids mentioning, are the work of medical experts of large and long experience. It is therefore wise to consult a doctor who has made a specialty of radiotherapy, and is competent to give sound advice.

X Ray Treatment. The medical profession has still much to learn in regard to the real value of the X ray, and its limitations in the treatment of disease. The ray is potent for ill as well as good, and in the hands of an ignorant or careless operator, it may rapidly cause great injury to him or his patient.

Some years ago the Röntgen ray was hailed as a cure for malignant growths, and particularly cancer of the skin. For primary cancer of the skin, the X ray is undoubtedly a successful remedy, if the treatment is given skillfully and is not delayed too long. But internal cancer is another matter. However, when the knife fails, the X ray is worth trying. The same is true of radium.

In late or hopeless cancer of the uterus, the use of radium and X ray often gives several years of freedom from pain and other symptoms. In certain other conditions, it is very useful.

CHAPTER 12

Simple Medicinal Agencies

Cathartics. Relief from chronic constipation can often be obtained by correcting the diet. Moderate meals, which will not overload the colon, taken at regular intervals, and containing an abundance of fresh or stewed fruit, entire cereals, ripe olives, and leafy vegetables, will, with physical exercise, abdominal massage, and regular habits, effect a cure. A tablespoonful of *agar-agar* three times a day, in milk or with a cereal, or one or two tablespoonfuls of liquid petrolatum night and morning, may be sufficient to secure a daily evacuation.

As far as possible, one should avoid the habitual use of all cathartic drugs, which tend to increase the constipation.

Where it is desired to evacuate the bowels quickly, as in a case of acute intestinal indigestion, intestinal colic, or diarrhea, one of the best remedies, especially for children, is *castor oil*. It is also valuable in case a foreign body has been swallowed, or when there is an accumulation of mucus in the bowel. To prevent nausea, it should be given in a little very cold orange or lemon juice. One teaspoonful is the usual dose for an infant. One to three tablespoonfuls is the adult dose. Castor oil is constipating in its after effect, which fact increases its value in acute diarrhea.

Epsom salts will cause an evacuation of the bowel in half an hour to one hour if the stomach is empty. It is of especial value where there is dropsy in the limbs or the abdomen. It is given preferably before breakfast, in a little water. The dose for an adult is one to three tablespoonfuls.

Freshly prepared *magnesium citrate* is more agreeable to the taste, and is particularly recommended for acute constipation with bilious headache. The dose is six to twelve ounces.

For the treatment of chronic constipation, the best laxative is *cascara sagrada*. In pure form, it does not gripe or irritate the bowel, and does not produce a laxative habit. The usual dose in *tablet form* is three to ten grains, and of the *fluid extract*, ten to twenty drops, taken at night, or in divided doses night and morning after meals. *Aromatic cascara* may be taken in teaspoonful doses night and morning as required. After the bowels are regulated, the amount of cascara should be gradually reduced.

An excellent simple laxative for bottle-fed babies is *milk of magnesia* given in one half teaspoonful or one teaspoonful doses two or three times a day, in milk. The adult dose is one to four tablespoonfuls. A mild and efficient laxative, especially valuable

after childbirth, or when constipation is due to being in bed, is *compound licorice powders*. The dose is one to four teaspoonfuls in a little water.

The drastic, irritating cathartics, as *croton oil*, *elaterium*, and *jalap*, are used in uræmic or diabetic coma, blood poisoning, *et cetera*, but should be taken only under the direction of a physician.

Stimulants. In simple cases requiring stimulation, a drink of *hot milk*, *hot malted milk*, *hot lemonade*, or *soup*, with heat to the extremities, will suffice.

Where a quickly acting stimulant is required, as in sudden heart failure, snake poisoning, or shock, one may give a half to one teaspoonful of *aromatic spirits of ammonia* well diluted in water. *Camphor* also is useful. The dose is one half teaspoonful of the *spirits of camphor* and one to three tablespoonfuls of *camphor water*. It is often given by hypodermic, three grains in sterile olive or almond oil.

Frequently a *hot saline enema* or a *hot coffee enema* is used as a stimulant.

Hypnotics, or Sleep Producers. Sleep-producing sedatives should be taken only for short periods, and *never without the guidance of a physician*.

Perhaps the simplest hypnotic is *veronal*, or *sodium veronal*, which is more soluble and acts more quickly. The dose of each is five to ten grains in capsule. They should be taken with a hot drink a half hour before retiring.

Bromide of potash or *soda* in doses of ten to twenty grains in water with a little sirup is given to allay nervous irritation and mental excitement, as in epilepsy, hysteria, and insanity.

Analgesics, or Pain Destroyers. Pain is not a disease. It is often a valuable symptom, as in acute appendicitis or ulcer of the stomach. Drugs to stop pain, while they give temporary relief, do not cure the disease, but often mask and obscure important signs, and give a false sense of security. *Analgesic drugs should be taken only upon the advice of a physician*.

For neuralgic pains, *aspirin* is the safest analgesic. It may be taken in tablet, powder, or capsule. Dose, five to ten grains.

Antacids. Antacids are remedies that combat and neutralize excess of acid in the stomach. For this purpose, *magnesia* is one of the best agents. It quickly relieves the distress, the burning pain, and the acid eructations. It may be taken as a powder in half teaspoonful doses in milk after meals, or as *milk of magnesia* in doses of two or three tablespoonfuls in water.

In acute gastritis with fermentation, vomiting, and diarrhea, *bismuth* (bismuth subnitrate) is a valuable remedy. A good preparation is the *milk of bismuth*. The dose for a child is one teaspoonful; and for an adult, one or two tablespoonfuls. The bowels should first be cleared of mucus and irritating material by a dose of castor oil.

Emetics. Emetics are drugs that produce vomiting. It is sometimes necessary to empty the stomach quickly, as in acute poisoning. One of the most effectual ways to produce vomiting is to have the patient drink copiously of *lukewarm water* or *salt water* and then *put the finger well down the throat*.

One or two teaspoonfuls of *mustard* in a cup of warm water is an efficient emetic.

Sirup of ipecac in doses of one half to one teaspoonful is given to a child where it is desired to empty the stomach of a load of decaying food. It acts more slowly than mustard.

Disinfectants and Antiseptics. A disinfectant or germicide is a chemical agent that destroys or prevents the growth of disease germs. An antiseptic is a substance that destroys poisonous germs or that prevents decay or putrefaction.

For wounds, see chapter 15.

For contagious diseases, see chapters 14 and 68.

Sores and Ulcers. A very excellent stimulating antiseptic to be applied to the cleaned wound is equal parts of balsam of Peru and castor oil.

Another very excellent preparation for sores and ulcers that do not heal:

R

Salicylic acid	10 grains
Pulverized starch	2 drams
Zinc oxide	2 drams
Vaseline	½ ounce

Clean the wound carefully and apply this ointment once a day.

When it is desired to affect mainly the respiratory tract, medicinal agents are given by inhalation. This may be accomplished by adding them to boiling water and inhaling the medicated steam; or by the use of an atomizer or nebulizer which, by means of compressed air, so finely divides the solution containing the medicament that it can be inhaled and thus applied to the irritated tissues.

Medicated Steam. In acute bronchitis, much relief may be obtained by inhaling, two or three times daily, the steam from a quart of boiling water to which has been added a teaspoonful

of compound tincture of benzoin, or a half teaspoonful of eucalyptus oil with an equal quantity of spirit of chloroform.

Atomizers and Solutions. Of the many types of atomizer, the writer prefers the De Vilbiss instrument. It consists of one



A De Vilbiss Atomizer

spray tube with adjustable tip, and two bottles for medicine.

In catarrhal conditions of the nose and throat, some specialists recommend the use of Dobell's solution. This can be purchased in any quantity. Use one part of Dobell's to two parts of warm water.

Follow with oily spray—simple albolene (paraffin oil); or—

R

Menthol	20 grains
Camphor	10 grains
Albolene	1 dram

As a stimulating oily spray in chronic bronchitis, the following formula is good:

R

Oil of eucalyptus	1 ounce
Oil of liquid tar	2 ounces
Albolene	1 dram

Mouth Washes. A teaspoonful of salt and a teaspoonful of soda to a pint of water will make an inexpensive and efficient antiseptic wash. Lavisol, listerine, or glycothymoline is good, diluted one part to two or four parts of water.

MISCELLANEOUS

Bruises. The black eye may be rendered normal within an incredibly short time, by the free application of warm olive oil, without rubbing. If the skin is broken, apply a little boric acid over the abrasion. The following prescription may prove helpful:

R

Spirits of camphor	1 ounce
Tincture of arnica	2 ounces
Witch-hazel	up to 16 ounces

Use with gentle friction.

Chapped Hands, Lips, and Face.

R

Lanolin	3 ounces
Olive oil	1 ounce

Cleanse the parts carefully, dry thoroughly, and apply, rubbing well.

Toothache Drops. About as good an emergency remedy as one can find is oil of cloves. Clean out the cavity as well as possible, and saturate a small piece of cotton with oil of cloves, and place in the cavity. Add another pellet of dry cotton to prevent the medicine from being washed out by saliva. Reapply in a few minutes, if necessary.

Earache Drops.

R

Carbolic acid	40 minims
Alcohol	14 minims
Glycerin	up to 1 ounce

Use warm, and introduce a plug of cotton following the application.

The following articles might be profitably incorporated in the family medical supplies:

Tincture of iodine—disinfection of wounds.

Lysol or cresol—antiseptic washes and irrigations. Use two teaspoonfuls to a pint of water (two per cent).

Boric acid crystals—to be made up into saturate solution and used for drops in inflamed eyes. Compresses.

Unguentin—the first thought in burns.

Mustard—for baths and the treatment of colds, and for an emetic.

Camphorated oil—for external application in the treatment of colds.

Vaseline—lubricant, soothing ointment.

Boric acid powder—antiseptic dusting powder.

Analgesic balm—counterirritant for relief of pain.

Oil of cloves—toothache.

Earache drops—see prescription above.

Rub alcohol.

Aromatic spirits of ammonia—stimulant.

Castor oil—purge.

Epsom salts—purge.

Aromatic cascara—mild laxative.

Clinical thermometer.

Adhesive tape.

Cotton.

Package of sterile gauze (Johnson & Johnson).

Bandage material.

The Place of Surgery in the Cure of Disease

The marvelous progress in surgical practice during recent years can hardly be described as less than phenomenal. A few decades ago even the simplest operation was fraught with grave dangers and often ended fatally. The art of surgery has been so wonderfully developed that at the present time any cavity or portion of the body can, at the hands of the experienced surgeon, be invaded, and with a margin of safety almost wholly on the side of the patient.

One of the chief factors in this progress has undoubtedly been the discovery of the principle of antisepsis by Lord Lister. The real *science* of surgery properly began with the knowledge of sepsis and antisepsis, received great impetus with the development of bacteriology, and more recently its possibilities have been much enhanced by the discovery of the X ray.

Time was when the village barber was the surgeon of the community. With no knowledge of anatomy or bacteriology, and with very little idea of ordinary cleanliness, to say nothing of disinfection, the results were more than likely to prove disastrous in the extreme to the patient. A beginning of relief from this chaotic state was made when the town council of Edinburgh in 1505 granted the Corporation of Surgeons and Barbers permission to dissect the body of one condemned man in the year.

The establishment of schools of anatomy gradually paved the way for the development of surgical procedures and the undertaking of more and more serious operations. The complications in the surgery of those days, due to ignorance of the principles of sepsis and antisepsis, are graphically outlined in another part of this book. (See chapter 1.)

In the early seventies of the nineteenth century, the immortal Lister initiated a new era in surgery. He gave to the world the results of his epoch-making studies of sepsis and antisepsis, which without doubt represent the greatest single advance in the history of surgical progress. A clean surgical wound, and healing by immediate or primary union, soon became the usual delightful experience of the surgical convalescent, in marked contrast to the pus-discharging, foul-smelling, inflamed, painful wound of pre-antiseptic days, which often caused the patient infinitely

more suffering than any other feature of the operation, greatly prolonging the convalescence, and often greatly endangering the patient's life or leading to distressing complications.

Another remarkable advance step in surgical development was the discovery of anæsthesia, first introduced to the world by an American dentist, W. F. G. Morton, D. D. S., of Boston, in 1846. Ether was the first chemical used, and is still the safest and the most used, for general anæsthesia. Many of the terrifying features of the operating room were thus eliminated.



The contrast in the methods of procedure in the operating rooms of the early nineteenth century and those of the present day, is apparent. In the former, the doctors in attendance wore their street clothes, the instruments lay about carelessly, and little thought was given to antiseptic measures, which are so rigidly enforced in modern surgery. The speed with which patients now recover from operations witnesses to the progress that has been made in surgery in the past few decades.

The possibility of quiet, peaceful, undisturbed narcotic sleep for the entire period of the operation has proved one of the greatest of blessings to the surgical patient.

Other anæsthetic agents have been developed. Chloroform acts more rapidly and is more powerful than ether, but not nearly so safe. Nitrous oxide, or the so-called "laughing gas," so long used by dentists, is coming more and more to be used in both major and minor surgery, and especially for inducing the early stages of general anæsthesia.

Local anæsthesia—that is, the injection of a nerve-paralyzing agent directly into the field of the proposed surgical operation—

is also developing into a wider and still wider field of usefulness. By this method, even major operations are now undertaken quite painlessly and with the patient completely conscious.

One is bound to admit that the increased safety of operative procedures has doubtless led the way to the doing of a considerable amount of unnecessary surgery. Surgeons themselves have not been unmindful of this tendency, and are constantly seeking to perfect the diagnostic technique that will enable them to determine with the greatest possible accuracy the clinical condition of patients and the presence or absence of surgical pathology.

SELECT A QUALIFIED MAN

For the purpose of raising the standard of surgical practice in this country, there has in recent years been established the American College of Surgeons. The standard of attainment necessary for admission to this college is such as insures the ability of its members to engage successfully in surgical practice. It is hoped that ultimately the license to do major surgery will be limited to those possessing sufficient qualifications to admit them as members of the college. This is not a "surgical trust," but a sincere effort to raise the standard of surgical work where it will be maintained as an art and a science, and where patients will be protected from the poorly and insufficiently trained practitioner.

The present-day ordinary medical curriculum does not fit a man to engage successfully in the practice of major surgery on emerging from school. Permission by the state to hang up a sign bearing the credentials "Physician and Surgeon" does not necessarily carry with it the assurance that the licensee is capable of bearing the heavy responsibility incident to critical surgical operations. And the general public and the trusting patient should know and realize this. It is not only the right but the privilege and the duty of every patient, having been advised to undergo an operation, to be reasonably satisfied as to the qualifications of the operator to whom the case is to be submitted.

Unfortunately this very important feature is all too often entirely overlooked, and the unsuspecting patient submits himself—or more frequently herself—to the veriest tyro in surgery. As has been tersely expressed by a famous surgeon, "Who asks to see the pilot's license of the man who undertakes to guide the ship of life through the treacherous waters which so narrowly separate the island of time from the mainland of eternity?" When prospective surgical patients ask to see this license, granted only on condition of complete demonstration of ability to meet the exigencies and emergencies of complicated and delicate surgery, they will be adding the necessary element of coöperation with

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the real surgical profession which will result in tremendously raising the standard of practice in the surgical phase of the healing art.

CHOOSE A STANDARDIZED HOSPITAL

Another factor that is giving great impetus to the program of better surgery is the nation-wide campaign of hospital standardization. This effort is fundamentally based on conserving the interest of the patient. It was begun in 1915 by the American College of Surgeons. A careful survey was made of the hospital situation throughout the country, and it was decided to adopt a so-called Minimum Standard of efficiency which would be required of every hospital. This Minimum Standard was developed and evolved from the combined experience of surgeons, internists, and hospital executives. It requires that physicians and surgeons who are permitted to practice in the hospitals shall be men who have demonstrated that they are competent in their respective fields, and worthy in character and in professional ethics. The Minimum Standard is an arrangement by which the hospitals can assure their patients the best care known to the science of medicine. It seeks to guarantee that all patients, rich and poor, receiving treatment in recognized hospitals, shall have efficient service, which will meet the requirements and standards that knowledge, experience, and humanitarianism demand as the unequivocal right of the sick at the hands of those to whom their life and well-being are intrusted.

This effort in hospital standardization has so appealed to the medical and surgical profession that at the present time the Minimum Standard has been adopted and is maintained in at least seventy-five per cent of the hospitals in this country. The standardized hospital thus becomes the guardian of the public health, rendering the best scientific service that it is humanly possible to give the patient. And its results may be summed up in the lowered death rate, the reduced number of operations, fewer post-operative infections and complications, and in the lessening of the number of days patients are required to stay in the hospital. The properly informed prospective hospital patient of to-day, before entering a hospital, will inquire, "Is the surgeon properly qualified?" and, "Does the hospital meet the required standard?"

CONSERVATISM IN SURGERY

In making an appeal in behalf of the prospective surgical patient for conservative care, and endeavoring to change places, in thought, with the patient in the matter of surgical advice to be given, a most eminent surgeon recently remarked, "It makes

a great deal of difference which end of the knife you are on." And after all, it is very helpful in the conscientious advice regarding the necessity for a surgical operation, if the surgeon demands of himself that he always render his decision on the basis of doing to others as he would have others do to him were he or a beloved member of his family the patient. The spirit of this sentiment is becoming more and more dominant in the surgical profession.

Between the reckless rushing into surgery and the utter condemnation of all surgery is a health-preserving, life-saving, constructive medium. In many cases, proper conservatism demands that every ordinary or even extraordinary therapeutic means be exhausted before resort is had to surgery. On the other hand, there is a large class of cases where true conservatism demands that the patient be rushed to the hospital and placed upon the operating table with all haste.

The medical profession are now practically in entire agreement with the surgeons, that the earliest possible surgical interference in acute appendicitis is true conservatism, and that any delay in such cases is an utter waste of precious time and a reckless playing with fate. Given a case seized with sudden abdominal pain, with general abdominal tenderness more intense over the appendix, nausea and vomiting, rise of temperature and an increase in the number of leucocytes, or white blood cells, and surgery should not be looked upon as a "last resort," but as the *first and only resort*. The same may be said of acute intestinal obstruction, peritonitis, strangulated hernia, acute mastoid infection, acute perforating ulcer of the stomach or intestines, and other similar acute conditions. An hour's delay in such cases may mean the difference between life and death of the patient. Extremely hazardous complications rapidly develop; and what with early surgical interference may mean a comparatively simple surgical procedure, with every hope of success, may otherwise, a few hours later, be an exceedingly difficult, complicated operation, with little possibility of the unfortunate patient's recovery.

We cannot close this chapter without adding a word of sentiment as regards the average surgeon's feelings. There seems to be a rather widespread sentiment that the surgeon enjoys "cutting"; that he revels in the sight of blood; that he is happiest when "knifing" his fellow men. Not so. It is a terrible shock to the tender sensibilities of a surgeon to be met by the frequent query, "Have you been *butchering* some one to-day?" "Whom have you been cutting up this time?" It is equally distressing

to hear one's capabilities and prowess summed up in the words, "He can cut a man to pieces and put him together again."

Such sentiments might be pleasing to the mere operator, but not to the true surgeon. The surgeon is not nor does he ever become a callous man. He enters with depth of feeling into the sufferings of his patients. His is a real tenderness—not the weak, sentimental kind that shrinks and turns helpless away at the sight of suffering, but the true tenderness which the sight of suffering spurs on to action, that courageous tenderness which is willing to sacrifice a limb to save a life, that dauntless tenderness which refuses to permit the eye to be dimmed by a sympathetic tear. This represents the feeling in the depths of the true surgeon's heart, and he feels that his greatest reward is the knowledge that his successful effort means the mitigation of human suffering, the prolongation of life in greater comfort, and the contributing to the sum total of human joy.

CHAPTER 14

Care of the Sick

One of the first essentials in the efficient care of the sick is the surrounding of the patient with favorable mental and physical environment. In cases of prolonged and serious illness, it may be necessary to make some decided readjustments in the home to provide for the comfort and welfare of the sick one. For acute sickness of short duration, marked changes are not required.

The Sick Room. The sick room should be light and cheerful, and so located that it will have the sun during some part of the day. In summer, an east room, getting the morning sun, is preferable; and in winter, a south or southeast exposure is ideal. The location should be conveniently near to a bathroom and remote from the odors of the kitchen. The room should be well ventilated, preferably though not necessarily with two windows, and simply furnished without useless ornamentation, but a stiff or bare appearance should be avoided. The walls should be covered with plain paper, or tinted in some soft, restful shade, as buff, tan, or light gray. Many a weak or nervous patient has been tired out by counting designs in wall paper or figuring out imaginary faces or objects. Even pictures on the wall should be few and of a wholly restful character.

The patient's room should be given up solely to her, anything belonging to other members of the family being removed from bureau and closet, that there may be no occasion for visits to the sick room in search of possessions.

The room should be kept scrupulously clean and in order. There should be a good place for all needed articles, and they should be kept in their place. Unnecessary articles should be taken away. Avoid cluttered tables and bureau tops; but in the attempt to have a well ordered room, do not disregard the patient's comfort by placing needed articles out of her reach or insisting on a smooth, tucked-in bed. Food should not be kept in the room, and all used dishes and soiled linen should be removed at once.

The cleaning should be accomplished with as little dust as possible, by the use of a broom covered with a damp cloth, or of a dust mop. Dust cloths should be moistened or oiled. If rugs cannot be removed for cleaning, vacuum cleaning is next best; or a carpet sweeper may be used, and the carpet afterwards wiped with a damp cloth.

Only light, washable curtains or draperies should be allowed in the sick room. One or two potted plants or a few well chosen flowers add to the cheer of the surroundings, but flowers of heavy odor should never be admitted.

That which appears but a trifle to one in health may be very disturbing to a sick person; as the motion of a rocking-chair, rustling of skirts, creaking of a door, flapping of a curtain, jostling against the bed or leaning against or sitting on it, whispering in the room or at the door, where the patient catches only occasionally if ever a word, and is almost sure to imagine herself the subject of conversation. An ordinary, well modulated tone of voice is proper for the sick room. All unpleasant conversation, or discussion of plans and personal matters annoying to the patient, should be taken elsewhere.

Air the sick room thoroughly once or twice each day, even in cold weather, by opening wide the doors and the windows. The patient should then be well covered, including the head. At all times, the bed should be protected from direct drafts. The bed should be placed with due consideration of the light on the patient's eyes, but a pleasing out-of-door view is desirable. Occasional readjustments of furniture and change of viewpoint are also restful.

Patient's Attendant. There may be several members of the family who would aid in the care of the sick, but the responsibility must be carried by one individual. This is important. This person should receive the doctor's orders and take them in writing, thus preventing serious blunders. Where there are medicines to be given, nourishment to administer at various hours, *et cetera*, it is well to write out a regular program to be followed.

It is also important that a record be kept for the doctor's observation, indicating the pulse and temperature of the patient (if in fever, two to four times daily, according to the severity of the illness), medicines and nourishment given, frequency and character of bowel movements, amount of sleep, and any other facts as to the patient's condition that the doctor should know. Such a record will be of great service to the physician, giving valuable information regarding the patient's condition, even though it is not kept on a formal chart.

To serve the best interests of the sick one, the attendant must have adequate sleep and a little time each day in the fresh air. True devotion is not evidenced by martyrdom to duty, but by keeping one's self at one's best. One may become so fatigued as to be unfit to be trusted with doctor's orders, and at the very time when most needed, be liable to fail. The one left in at-

tendance during relief hours is responsible to the one who is in charge of the patient, and should render a report in detail upon her return.

Beds and Bed Making. A comfortable bed adds as materially to the comfort of the sick as do pleasant surroundings. In long illnesses, and especially with helpless patients who must be turned and lifted, the usual low, wide bed is very inconvenient. The bed should be wide enough to give the patient a feeling of security and freedom without requiring the nurse to kneel on its edge when reaching to support or lift her. The most satisfactory dimensions are six feet six inches long by thirty-six inches wide, and twenty-four to twenty-six inches high. If there is in the home a single or three-quarter bed, it can be raised to the height required, by removing the casters and placing the legs of the bedstead on large, heavy blocks with hollowed upper surface in which the legs will fit snugly. Iron beds of smooth pattern, easily kept free from dust, are most desirable. The springs should be firmly stretched, with no sagging, and the mattress should be comfortable, free from lumps and hollows. The mattress should be turned frequently from end to end and side to side alternately. Bedding and pillows should be aired often.

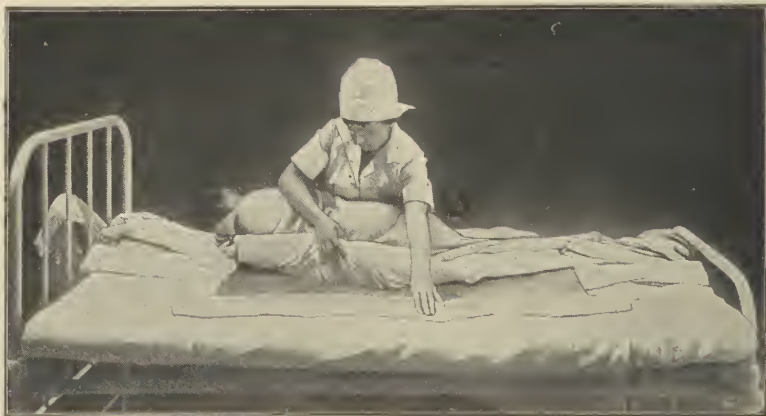
It is a fairly simple matter to make a bed properly when the patient can sit up or be moved to a cot during the process. The mattress should be protected by a pad of its full size, or by a blanket or quilt that can easily be washed. Sheets should be at least three fourths of a yard wider and longer than the bed, to allow for securely tucking in. The lower sheet should be placed over the mattress protector, right side uppermost, with the wide hem at the top, and snugly tucked in at top, bottom, and sides, with smooth, square corners. Be sure to place this sheet straight; otherwise it will more readily wrinkle. When the bed must be protected from discharges, a rubber sheet may be used; but such are hot and uncomfortable, and should be dispensed with unless really needed. The rubber sheet is placed over the lower sheet, with upper edge at the lower edge of the pillows, and the lower edge reaching to the knees, being approximately one yard wide, and should be long enough to tuck well under the mattress at either side. Care should be taken that this rubber sheet is free from wrinkles, and a crack or even a pinhole near the center may render it of no value.

A drawsheet, which is an ordinary sheet folded once lengthwise, should be placed with the folded edge at the top, over the rubber sheet, extending two or three inches above and below it, and smoothly tucked in at either side, the longer portion being left at one side. Where no rubber sheet is needed, the drawsheet

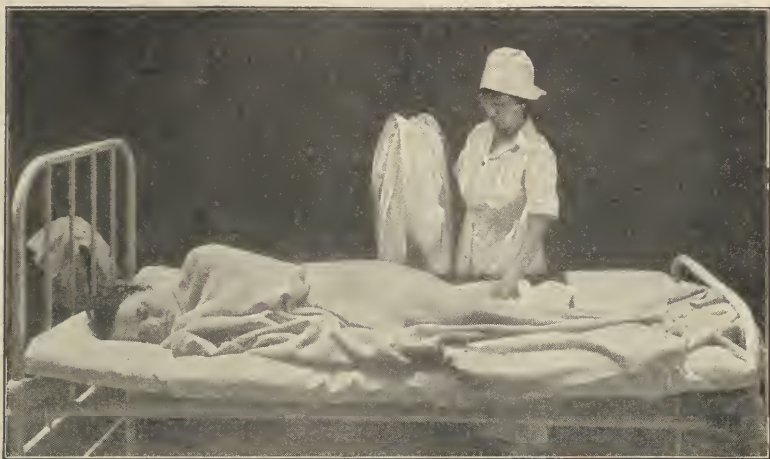


MAKING A BED WITH THE PATIENT IN IT

Loosen the bedding on all sides. Remove the pillows, and all the covers except the top sheet and one blanket. Have fresh linen on a chair near at hand. Roll the patient to one side of the bed. Roll all the soiled linen close up to the patient's back. Place the clean bottom sheet in position, tucking it in at the head first, smoothly and evenly. Now roll the fresh bottom sheet close up under the edge of the soiled bottom sheet. Go to the other side of the bed and unroll the rubber sheet smoothly over the clean bottom sheet, tuck in, and adjust the clean drawsheet. The drawsheet is an ordinary sheet folded to a proper width to cover the rubber sheet.



From the opposite side of the bed, pull the clean drawsheet close up under the soiled drawsheet at the patient's back. Then, lifting the top covers slightly, gently roll the patient to the clean side of the bed.



Quickly remove the soiled linen, and draw the fresh linen into place, tucking in tightly and without wrinkles. Now a pillow can be placed under the patient's head, and the patient turned back to the middle of the bed.



To place the top linen, throw over the soiled top sheet and blanket a clean sheet. Let the patient hold it close up under the chin. Reach under the clean sheet, grasp the blanket and the sheet, and with a quick pull toward the foot of the bed, take them off together. Finish adjusting the covers, spreading each one smoothly, and turning the top sheet down over all, to form a clean chinpiece.

is still a great convenience. It can be drawn to one side or the other, and thus the patient has a cool, smooth spot on which to lie; or in case of accidental soiling of the bed, it can be changed with very little inconvenience to the patient, and without remaking the whole bed.

Next the upper sheet is placed face down upon the lower sheet, with the wide hem several inches above the head of the mattress. This is smoothed out carefully and tucked in at the bottom, with smooth, square corners. Then place the blanket or blankets, with the fold at the foot, and the upper edge about eight inches from the top of the mattress. Blankets are better



The finished bed. Notice the method of combing the patient's hair. Arranged in two braids, it is easy to brush and comb by simply turning the patient's head on the pillow.

than comfortables or quilts, because they can be laundered and are lighter for their warmth. The bedspread is then arranged with the upper edge about three inches above the blanket, this margin to be turned under to cover the edges of the blanket. The lower edge is tucked under the mattress, with square corners, and the sides are left hanging. The upper sheet is turned back over the spread about twelve inches. Place the pillows, well shaken and fluffy, and the bed is ready for its occupant.

To change the bed linen without removing the patient is not a difficult task. We proceed as follows: First have fresh linen all in readiness. Loosen the bedding on all sides. Remove the spread, and the top blanket if there are two; then, holding the remaining blanket with one hand, gently draw out the upper

sheet from beneath it. Move the patient well to one side of the bed, and turn her with her face toward the edge nearest her.

Remove the pillow, and bring the blanket up close around her. Next roll the drawsheet and the rubber sheet together if both are to be removed, and separately if the rubber sheet is to remain on the bed; then roll the lower sheet through its entire length, and bring the three sheets, rolled as tightly and flatly as possible, close to the patient's back. Take the fresh lower sheet, and fold it lengthwise, placing the fold as near the middle of the bed as possible, and tuck in the under half, as in an unoccupied bed, and pleating the upper half, bring it up close to the roll of soiled linen. Draw the rubber sheet back over the fresh lower sheet if to be replaced, and fold and place the fresh drawsheet, tucking it in at the side, and pleating the free end close to the patient's back.

Lift the patient's feet, with knees flexed, over the closely rolled bedding, and going to the other side of the bed, gently turn the patient back over the rolled sheets onto the fresh, smoothed portion, keeping the covering blanket in place. The soiled bedding is then quickly removed, and the fresh drawn into place and tucked in snugly all around. Place the fresh upper sheet over the blanket, the second blanket over this, and then, holding these in place with one hand, remove the lower blanket with the other hand, and place it above, arranging the spread as before directed, tucking all in at the foot, being careful not to draw them too tightly over the patient's feet.

It is essential that the bed be kept fresh and clean, but without extravagance of linen. The upper sheet, unless soiled, can be folded and used as the drawsheet.

One patient can make use of a number of pillows, and they add wonderfully to one's comfort. They need not all be of feathers; smaller cotton pillows serve just as well. They make comfortable position possible by lessening the muscular tension. For example, when the patient is lying on her back with the knees flexed, a pillow under the knees and another for the feet to rest against are helpful. A weak or helpless patient turned on one side appreciates a pillow tucked up to support the back, and a tiny pillow slipped under the abdomen helps. When on the side, flexing the upper knee a little more than the under one and placing a pillow between the knees allows of a very restful position. When the patient is able to be bolstered up in bed, pillows again form the support. Simple back rests covered with canvas can be purchased or improvised; but a kitchen chair turned with the back down and the legs against the head of the bed to form an inclined plane, and well padded with pillows, serves the

purpose very nicely. If the patient is very weak, a pillow under each arm while she is thus sitting makes her much more comfortable; and again, pillows as knee supports and foot rests are needed. Little things that may appear trivial count very much to the sufferer.

Personal Care of the Patient. The daily care of the patient begins with the morning toilet, when the face and the hands are washed, the teeth cleaned, the hair brushed, the bed smoothed, the pillows shaken, and the patient freshened for breakfast.



A kitchen chair in service as a back rest. Note the arrangement of the pillows for comfort.

The temperature, when indicated, should be taken the first thing in the morning, before the mouth is cleansed or the patient has had water or food. To get an accurate temperature record any time of day, it should not be taken for ten or fifteen minutes after drinking, nor for at least a half hour after a meal. Breathing very cold air or mouth breathing will also affect the temperature. The mercury should be shaken down as low as 96° , then the bulb of the thermometer placed well under the tongue, and the lips kept firmly closed for two minutes. A little practice is required to read a thermometer readily. After using, rinse the thermometer in cold water and disinfect with alcohol. The normal temperature of a person in health is 98.6° , though there may be a slight variation during the twenty-four hours with a person in perfect health.

With delirious or unconscious patients or infants, the temperature cannot be taken by mouth, but must be taken by rectum or axilla. The most accurate method is by rectum, the best position for the adult being on the side. Place the infant on its back, and grasping the legs, hold them firmly erect. The thermometer should be lubricated, and inserted two inches for the adult, and one inch in case of an infant, and held for three minutes. It should then be washed with cold water and soap, and disinfected with alcohol, and when used for rectal temperature, should not be used by mouth. The rectal temperature is about half a degree higher than by mouth, while by axilla it is about half a degree lower. To take the temperature by axilla, first wipe the armpit dry and place the thermometer, holding it for five minutes, by pressing the flexed arm tightly against the chest wall. While taking the temperature, take the pulse also. The pulse is most conveniently felt on the thumb side of the front of the wrist. Place two fingers over the pulse until the beats can be felt distinctly, then notice the time by the second hand on the watch, count for a half minute, and multiply by two. Repeat for another half minute, and another. The count should not vary more than by two. The pulse rate varies greatly with different individuals, but seventy-two to eighty a minute is considered normal. Any irregularity in the pulse may be significant, and should be noted and reported.

In illness involving the lungs, the rapidity of the respirations is of great importance. Normally we breathe from sixteen to twenty times a minute; while in pneumonia, the number may run up to forty or fifty. It is difficult to count the respirations if the patient is aware that you are doing so, because then she does not breathe naturally. A good way is to have the patient's forearm lying across her chest, and count the respirations while apparently taking the pulse. Respirations are best counted for the full minute.

The care of the mouth and teeth of a patient is a fair index to her general care. In sickness even more than in health, the mouth may become a breeder of disease germs. Bacteria are always present in the mouth, and, mingled with the mouth secretions and particles of food, will form a coating upon the teeth and the gums unless frequently removed. The teeth should be brushed at least in the morning and at night. To clean them thoroughly, a good brush should be provided, and applied with a firm rotary motion, "not across, but with the cracks, as a good housewife sweeps the floor." The patient will prefer to clean her own teeth if at all able. The attendant spreads a towel under her chin, holds a glass of tepid water and the tooth paste or

powder, and a patient unable to sit up can help herself by turning the head to one side, when provided with a shallow basin to receive the used water. The tongue, which is often fur-coated, should also be cleansed and the mouth rinsed with a disinfectant mouth wash.

If the patient cannot do these things for herself, the attendant should carefully cleanse the mouth by using small swabs, which can be made by winding a strand of absorbent cotton on a wooden applicator or toothpick. Cleanse the tongue, the gums, the teeth, and the crevices between the teeth, by dipping the swabs in a good mouth wash, diluted, discarding each swab after using it, never dipping a second time into the solution. False teeth should be removed and brushed, and should be kept in cold water if removed for the night.

In illnesses where there is much fever, and in cases where the patient breathes through the mouth, the lips often become parched and the mouth very dry. This may be prevented or greatly alleviated by frequently moistening the lips, and by applying glycerin, also placing a few drops of glycerin on the tongue.

Long or heavy hair becomes tangled in a surprisingly short time unless well cared for. It should be thoroughly brushed and combed in the morning, and again, not necessarily so thoroughly, at bedtime. A towel should be laid over the pillow, and the patient's head turned to one side. The hair is divided into two portions, parting from the forehead to the nape of the neck. Begin brushing rather slowly at the ends of the hair, holding firmly with the hand above until all tangles are removed. Comb gently, and braid near the ear, as firmly as is consistent with the patient's comfort, and tie the end. The other side should be dressed from the opposite side of the bed. Never work across the patient. The patient may be too fatigued, if the hair is heavy, to have the hairdressing all completed at one time; but unless she is in a dying condition, it should never be neglected for a day.

Care of the Bowels. When a person is confined to bed, with no exercise, there are more than the usual tendencies to constipation. One may be able to control this condition by a laxative diet; but for proper elimination, there should be at least one good bowel movement each day. If one is not otherwise secured, an enema should be given. For this, protect the bed by placing a rubber sheet covered by a large towel under the patient's hips. A pad made of a newspaper covered with a towel serves every bit as well as the rubber sheet. With the patient lying on the back and the knees flexed, raise the gown above the hips and place the bedpan. The style known as the "Perfection" is the most



An ideal equipment for the sick room: hot water bottle, enema or douche can, ice cap, record chart, pitcher, bowl, spitting basin, urinal, bedpan, and (on the tray) pitcher and goblet for drinking water, medicine glasses, and thermometer.

comfortable except in cases where there is great difficulty in lifting the patient, when the ordinary slipper-shaped pan may be used. The pan should always be warmed before using. This is easily accomplished by running hot water over it, then drying the outside. After placing the pan, support the small of the back with a pillow. Always lift the hips with one hand before removing the bedpan, as the skin easily adheres, and more than one bed sore has resulted from carelessness in this particular.

Bring to the bedside a roll of toilet paper, vaseline, a slop jar, and lastly the fountain syringe containing the solution. The water should be warm, about 105° , unless otherwise ordered by the doctor. The addition of salt, a teaspoonful to the pint, makes the water less irritating to the mucous membrane. In stubborn constipation, good soapsuds made from Castile or "Ivory" soap are more effectual. This should always be followed by a small, plain water enema, as the soapsuds are irritating to the bowel. The fountain syringe should be not more than three feet above the level of the patient's hips, and the stopcock should be opened until the solution runs in a steady stream of even temperature. The hard rubber enema point should be lubricated with vaseline, either by pressing the vaseline from a tube, or if it is in a jar, by removing a small amount with a bit of tissue paper, never by inserting the point in the jar. The point is then inserted gently into the rectum and the flow of water started.

An adult should take from two to four pints of water, while a child will retain from one to two pints. If there is a desire to expel the water as soon as the enema is begun, stop the flow for a minute and lower the fountain syringe, and begin again slowly. Better results are obtained if the water can be retained for a few moments. The injection may need to be repeated before good results are secured. A newspaper spread over the patient's knees and legs forms a protection to the upper sheet should the water be expelled with some violence. The bedpan should be covered immediately when removed, and emptied at once.

Bathing. A bed patient should have a bath of some sort every day, and a soap bath at least every other day. A plain sponge bath of warm or cool water may be given on alternate days, or a friction of cool salt water. As many poisons are eliminated through the skin, it is important that it be kept clean.

The bath is usually best given in the morning, about an hour after the breakfast, just before the bed is remade, unless there is good reason for administering it in the evening. If possible, have two single blankets that are kept as bath blankets. Loosen the bedding at the foot, and remove the spread and the blankets, spreading them over backs of chairs to air. Place one bath blanket over the upper sheet, and holding at the top with one hand, draw the sheet out from below with the other. Arrange the other blanket under the patient by turning her to one side, the same as you would to place the lower sheet in bed making. This puts the patient between two blankets, with very little danger of chilling. When this is not convenient, an old sheet or an extra bath towel may be used to protect the bedding from dampness.

Have at the bedside a basin of water at about 105°, a pitcher of hotter water, a slop jar, two wash cloths, a face towel, one or two bath towels, soap, nail file, scissors, alcohol fifty per cent, talcum powder, and the patient's clean gown and bed linen. Remove the patient's gown in the following manner: Let her lie on her back with the knees flexed, and draw the gown up as far as possible, when the hips are raised and the gown is slipped up above the hips. Then, supporting the head and the shoulders with one arm, bring the gown up to the neck, and remove one sleeve. It is next slipped over the head, and the second sleeve removed. In cases of paralysis, rheumatism, neuritis, or similar conditions that have affected one arm, always remove the sleeve from the afflicted arm last; and in replacing it, this arm should be dressed first.

The room should be warm, at least 70°, and the patient warm, before the bath is begun. If necessary, put a hot water bottle at the feet. First bathe the face, the neck, and the ears, using care that the water does not drip; then dry thoroughly. Next, with a bath towel spread under the arm, bathe the arms and the hands with soapy water, using the second wash cloth, rinse, and dry. Bathe the chest and the abdomen, then each thigh and leg. Placing a bath towel on the bed, set the washbowl, not too full, on the towel, and flexing the knees, put the feet one at a time in the bowl and bathe them. Next turning the patient on her side, bathe the back and the hips in firm circular strokes, dry, and finish by stroking the spine.

Dry each part thoroughly before proceeding to the next. Use freely of soap, but see that it is well washed off. Empty and refill the basin frequently. The parts that are sometimes slighted in bathing are the armpits, the navel, the inner thighs, and between the toes. A bath is not complete unless the genitals are thoroughly cleansed. If the patient is able, she should be provided with a wash cloth, and bathe them herself. Otherwise the attendant should do it for her. Neglect is unkindness, though prompted by a mistaken sense of modesty.

The patient's back and hips should be rubbed with alcohol, especially all points of pressure. A light general rub with talcum powder gives the patient a feeling of freshness and a sense of being well groomed.

To replace the gown, gather it up in such a way that it forms a circle, and place it on the chest, with the folds of the back just beneath the chin. After slipping on the sleeves, lift the head, and slip the garment over, drawing it down carefully over the shoulders and under the hips.

The patient's finger nails and toenails should be kept cleaned and trimmed as a part of the bath routine. A thoughtful attendant will endeavor to save the strength of a weak patient in every way possible.

When the bath is completed, the bed can be made before the patient is turned back, so that one turn will suffice. The successful attendant upon the sick will learn to anticipate the needs of her patient, to see the little things to do for her comfort without being asked, and will guard her interests, not allowing her to be wearied by visitors or annoyed by gossip. If the patient is feverish or restless in the afternoon, rubbing the back and the legs, or sponging with alcohol or witch-hazel, is very soothing. Too heavy bed covers may be responsible for such restlessness.

The evening must be free from excitement, and early preparations be made for the night's rest. If the attendant sleeps in the room, she should prepare her own cot, then make the following preparations for the patient: Wash her face and hands, cleanse the mouth, brush the hair, and change her gown. A different gown for day and night is advisable. If she is very sleepless, a hot foot bath may be given to quiet her. Have the patient use the bedpan.

Turn the patient on her side, and brush the bed free from crumbs. A small whisk broom is excellent for this purpose. Loosen the lower sheet and the drawsheet, pull them firmly, and retuck under the mattress; then do the same to the opposite side. Rub the back and the hips, using firm circular strokes, and finishing with long, soothing strokes to the spine. Remove the pillows, and shake and readjust them. Loosen the covers at the foot. Pull the nightgown down smooth, straighten the upper sheet and the blankets, and tuck in again, allowing plenty of freedom, and adjust the covers from above. Ask the patient if there is anything more that she wants; then, turning out or adjusting the light, say "Good night" and leave the room, that the patient may go to sleep. This prevents her lying vaguely expecting your return or thinking that something more is to be done.

Administration of Medicine. All medicines should be accurately measured. A medicine glass with graduated scale showing the number of teaspoonfuls is most convenient. When measuring out medicine, have your mind on nothing else. First read the label on the bottle, then shake thoroughly to mix the contents, and read again. Holding the medicine glass on a level with the eyes, remove the cork, and hold the bottle with label side up, to prevent soiling while pouring. Recork the bottle and reread the label before administering the drug. Most medicines

should be diluted with a little water. Pills or capsules should not be presented to the patient in the attendant's fingers, but in a saucer or a teaspoon. Powders are usually given dry on the tongue and followed by a drink of water. They may be dissolved in water or hot milk.

An unconscious patient should have medicine dropped far back on the tongue, to compel swallowing. Powders should never be administered by mouth to one unconscious, as they may cause suffocation.

Acid medicines and those containing iron should be taken through a drinking tube, to prevent injury to the teeth.

Medicine glasses, spoons, and tubes should always be well cleansed after they are used.

In administering oils, such as castor oil, first rinse the glass in very cold water, leaving a little cold water in the bottom, then add the dose of oil and more cold water. The cold water prevents the oil from sticking to the teeth and the tongue, and enables the patient to take it in one swallow. Sucking a lemon or an orange immediately after, quite effectually obliterates the taste of oil.

As grave results sometimes follow the giving of wrong medicines, one cannot be too careful. Never give medicine from a box or bottle that is not labeled. Never give or take medicine selected in the dark, no matter how positive you are that there is not another bottle in the house. Never leave medicine within the reach of children or delirious patients. Keep poisons by themselves and away from other drugs. Never leave disinfectants standing in glasses or in unsafe places. Bichloride of mercury has been mistaken for drinking water.

If for any reason a dose of medicine has been omitted, do not attempt to rectify the omission by increasing the next dose.

Feeding the Sick. The problem of diet in sickness is of great importance, and may mean the difference between life and death. Often it forms an important part of the treatment and is prescribed by the physician. A few general principles only can be given here.

In acute illnesses beginning, as they often do, with headache, fever, nausea or vomiting, and perhaps sore throat, it is best to withhold all food for the first twelve to twenty-four hours, or until a doctor is called. Give freely of water, hot or cold.

There are two extremes to be avoided in sickness—underfeeding and overfeeding. As the vital processes of the body are reduced, such nourishment should be given as will require the least labor of the digestive system. In fevers particularly, such foods should be chosen as are easy to take, easy of digestion, and easy to assimilate. A liquid diet is best adapted to fever condi-

tions. Fruit juices, especially orange and raspberry juices, make a cooling and refreshing beverage in acute fevers, and may be taken exclusively for a few days; but in fevers of longer duration, where there is much wasting of tissues, liquids containing a high percentage of food elements should be utilized. Milk, thin gruels, soups, albumen water, eggnogs, broths, and some of the prepared foods, as malted milk, suggest both nutrition and variation. Milk contains the various food elements in a suitable combination, is easily digested, and agrees with most patients. If some inconvenience is experienced in cases of high acidity of the stomach, this may be corrected by the addition of one or two tablespoonfuls of linewater to each glass of milk.

Meat extracts and beef juices, which many think are so essential, are simply stimulants and have no actual food value.

Liquid foods should be administered every two or three hours, and six or eight ounces (about one cupful) at each feeding. Water should be given freely between these intervals.

As we pass from the strictly liquid diet to the semisolid or soft diet, milk and cream toasts, soft poached or jellied eggs, soft custards, well cooked cereals, ice cream, junket, and similar foods may be added.

The convalescent diet is a simple mixed diet, which may include baked potato, a few green vegetables, *purées*, most fruits, excluding the banana, and simple desserts, but excluding all fried foods and those difficult of digestion. Additions are gradually made until a full diet is reached. One should always bear in mind that a person who is not exercising cannot thrive on full, hearty meals that a laboring man could well take care of. For example, a man may be confined to his bed with a broken leg, and he is allowed full diet; but this does not mean that he may have anything he desires, in any quantity and at any time. Discomfort and irritability that are attributed to the illness, are oftentimes rather due to injudicious eating or to overeating.

Serving the Food. In dealing with the sick, effort must be put forth to foster the appetite. One who is never overfastidious when well may become most capricious when weakened by disease.

Food should be served with regularity, as the desire for food may disappear with long waiting. A weak patient waking very early in the morning will often go back to sleep after a hot drink, such as malted milk; likewise a glass of hot milk at night may induce sleep. The patient should not be kept waiting for breakfast until the family have been served and the morning duties done.

The manner in which food is served has very much to do with its palatability. All dishes and linen must be scrupulously clean.

The tray should not be overcrowded, and the foods should be arranged for the patient's convenience in eating. It is better to serve a second course than to overload the tray. Avoid the use of cracked or chipped dishes, and aim to make the tray dainty and attractive.

Cups and dishes should not be so full that they are likely to be spilled in carrying. Hot foods should be served hot, and cold foods cold. The food should be of the best quality and properly seasoned. A tainted egg in an eggnog, or a bit of stale food, may



A dainty tray means everything to the appetite of an invalid.

forever turn a patient from that form of nourishment. The food should be tasted before being served, that any defect may be detected; but this should not be in the presence of the patient or with the same spoon. Hot liquids should be tested; but the attendant should never blow them, or taste them with the patient's spoon.

A certain element of unexpectedness stimulates the appetite, and variety from meal to meal is more desired than a great variety at one meal. Large servings of food do not tempt sick persons. It is far better to serve a second helping of a pleasing dish than for the patient to be repelled by an unduly large portion.

Before the tray is brought, the patient should be placed in a comfortable position, and one in which she will not tire before the meal is ended. A helpless patient must be assisted in eating. Liquid foods may be served through a drinking tube. If giving

a drink from a glass, raise the patient by slipping the arm beneath the pillow and lifting. This is much better than raising the head alone. When feeding a patient from a spoon, place the napkin under her chin and sit by the bedside. Allow plenty of time between mouthfuls. The patient should never feel hurried at her meals.

Great caution should be exercised in feeding an unconscious patient. Only liquid food should be given, and that should be put well back on the tongue, to induce swallowing. Not more than a teaspoonful should be given at a time; and be sure that this has been swallowed, before giving more.

CARE OF CONTAGIOUS CASES

Persons suffering of contagious diseases should be excluded from public gatherings and should be isolated.

For the purpose of isolation, a large, airy, sunny room, preferably on the top floor, should be selected, and all rugs, carpets, drapery, extra clothing, and surplus furniture should be removed. Flies and animals are to be excluded.

When daily routine disinfection is properly carried out at the bedside, there is not so much need of terminal disinfection.

All dishes are to be cleansed, boiled, and retained for use in the sick room.

All discharges of the patient may well be considered as pure cultures of pathogenic microorganisms. The sputum and the nasal discharges are best received in paper or cloth and burned.

The nurse should take every precaution to prevent soiling of bed linen or clothing by the urine or the fecal discharges.

The urine is disinfected by the addition of an equal quantity of five per cent crude carbolic acid, and should stand for two hours before being disposed of.

The stools are treated with three times their volume of five per cent crude carbolic acid, and should be well mixed with the solution. Another excellent method is to add a quart of boiling water to the stool and a little fresh quicklime.

Soiled bed linen and clothing should be placed at once in five per cent carbolic acid in water and remain for three or four hours, and then be boiled. Mattresses must be treated with live steam under pressure, or, perhaps better, incinerated.

To disinfect bath water after use, add two and one fourth pounds of chloride of lime to an ordinary bath and allow to stand for a half hour.

The nurse or attendant should wear a surgical gown, or a sheet properly draped about her person. It is best not to take food or drink while in the sick room. As far as possible, she

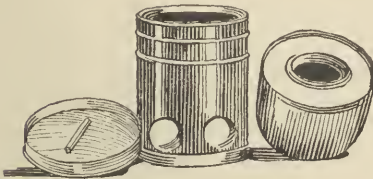
should avoid contaminating her hands, and should keep fingers and pencils out of her mouth.

For disinfecting her hands, the free use of laundry soap is very good. One per cent lysol and pure alcohol are for this purpose the best chemical disinfectants. Mercury bichloride, or corrosive sublimate, in a strength of one to one thousand in water, is efficient, but its repeated use is irritating and hardening to the skin. It cannot be used for disinfecting instruments, as it will quickly corrode them.

During epidemics of typhoid fever, all drinking water and milk should be disinfected by boiling.

Fumigation of rooms that have been occupied by contagious or infectious cases is sometimes desirable, but is not so commonly required by health boards as formerly. However, the destruction of bedbugs or other vermin is sometimes most successfully accomplished by fumigation.

The agents most used are formaldehyde (formalin) and sulphur fumes. In either case, the room should be tightly sealed, all openings and cracks being closed by plugging or by pasted strips of paper.



A Formaldehyde Candle

If formaldehyde is used, the room temperature should

not be below 65° F. Lines should be stretched across the room, and on these should be placed sheets soaked in a quantity of formalin, about eight to ten ounces being provided for a thousand cubic feet of space in the room. An ordinary room can be fumigated by the formalin held in suspension by one sheet. Nowadays this task is made simpler by formaldehyde candles, with the directions on them, which can be procured in any drug store. The chief thing with these is to see that all cracks are covered, and that a sufficient strength is used for complete annihilation of all bacteria and germs. At least ten and not more than twenty-four hours should be allowed to elapse before the room is opened.

The advantages of sulphur fumes are that sulphur is cheap and can always be obtained; but it has a tendency to corrode certain metals, and at times will bleach fabrics. Five pounds of sulphur should be provided for every one thousand cubic feet of space. These fumes ought to act in from three to twelve hours.

The room is prepared in the same manner as for formaldehyde. In the center of the floor, on brick or tile, is placed an iron kettle with the proper amount of sulphur for the disinfection of the room. The fumes are conveniently generated by means of the

burning of crushed sulphur piled up in the pot. A depression is made on the top of the pile, and filled with cotton waste saturated with alcohol. Following its ignition, there should be sufficient burning to ignite the sulphur and liberate the sulphur dioxide. The fumes of sulphur dioxide are very destructive to insect life, and dangerous to man when introduced into the lining membranes of the lungs and throat. Great care should be exercised in the opening of the room, lest one be overcome by the fumes, thereby suffering a great deal of inconvenience and irritation.

The best method of terminal disinfection is to scrub thoroughly the floors, the woodwork, and the furniture with laundry soap and water. A vacuum cleaner may be used upon the walls, and new paper or a coat of fresh paint or calcimine applied.

Section IV—First Aid in Emergencies

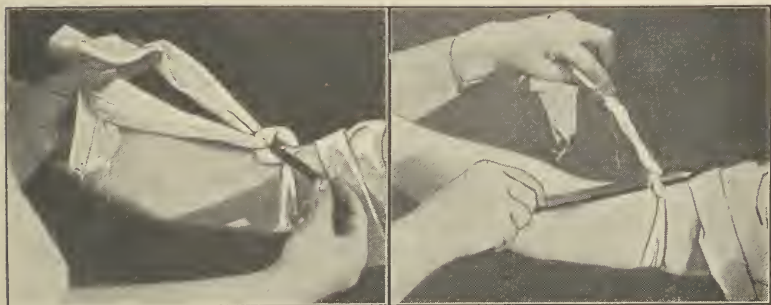
CHAPTER 15

Bleeding, Fractures, and Burns

The object of this section is, to give information on first aid measures to be applied by the intelligent layman until the help of the physician can be obtained, or to enable him to determine the necessity of calling more skilled help. Two things are included in first aid: emergency treatment of the patient, and the proper transfer of the injured or afflicted to a safe place.

In the case of wounds and injuries, the first aid worker should bear in mind the following purposes: first, to relieve pain; second, to check hemorrhage; third, to prevent infection of the wound; and fourth, to safeguard further extension of the injury.

Pain. Aside from the discomfort of pain, it may actually cause the death of the patient. Pain causes shock to the vital nerve centers, and in severe cases, cannot be endured long without its effect's being noticed in the pulse and the body temperature, and in exhaustion and prostration of vital functions. If the pain can be lessened by general sedatives, local applications, or the correction or protection of injured parts, the recovery of the patient is hastened. Pain almost always indicates that there are destructive changes taking place in the tissues, and it serves as a warning



A tourniquet is useful to stop a bleeding artery or vein. A large handkerchief or cloth is knotted around the injured limb, above the wound if an artery, below if a vein. A stick is thrust through the knot and then is twisted very tightly — or until the bleeding stops.



A first aid outfit should be in every home.

to the body to call for correction of conditions or manner of living which will minimize the injury. If it is unheeded, the situation may pass beyond control.

Hemorrhage. In case of hemorrhage, be sure to ascertain the location of the bleeding point. Often a scalp wound has been overlooked because the bleeding was referred to the ear, where the blood was perceptible. Sometimes a tourniquet or a bandage is placed around an arm or a leg without removal of the clothing to ascertain the exact point of injury. If the cut is above the point bandaged, the patient may lose a dangerous amount of blood before the mistake is discovered. It is very important to stop hemorrhage. Much blood may be lost by a continual oozing from a very small vessel.

Infection. In order to prevent infection of the wound, or further injury of the parts affected, it is necessary to see what one is doing. Although careful not to expose the body to chilling, one should open or remove the clothing sufficiently to determine all that can be learned of the injury and its extent. While first aid in certain cases requires that one shall act quickly, yet more important is it to act intelligently and not blindly.

In case of injury, it is better that one, two, or three individuals take charge and disperse the crowd. This will leave them freer to carry out the procedures in first aid. Some one should make a careful note of the circumstances and the situation, and take names and immediate evidence of those knowing about the occurrence. When a person is found unconscious, this may be

especially helpful in arriving at the cause and affording knowledge for further treatment.

In most cases of injury, it will be found best to send early for competent help and make provision for the removal of the patient. But time should first be taken to acquaint one's self with the facts, and to convey as much information to the physician as necessary when telephoning; and *do not* hang up the receiver until you make sure that the physician or the ambulance driver knows the exact location of the injured patient. Be specific.

HOW TO STOP BLEEDING¹

Hemorrhage from or in any part of the body may be controlled best by tight bandage, or by the application of prolonged cold in the form of ice, ice bags, or ice compresses, or by pressure.

If from upper or lower limbs, scalp, or face, pressure should be made, first by a thumb or a finger, and then by a tourniquet, over the trunk of the artery supplying the part from which the blood is flowing.

Stop *bleeding from the head and the face* by pressure on the carotid arteries in the neck, on either side of the windpipe, or on the temporal or facial arteries if bleeding is from parts supplied by them. The temporal artery is found just in front of the ear, and the facial comes up over the lower jaw about one inch in front of the angle of the jaw.

Bleeding in the shoulder can be stopped by making firm pressure just back of the collar bone, between the shoulder and the neck.

For *bleeding in the arm*, if above the elbow, do as in bleeding in the shoulder, or make pressure just beneath the biceps muscle, on the inner surface of the arm, pressing the artery down upon the bone of the arm.

In case of *bleeding in the forearm*, do as in hemorrhage from an arm; or place padding inside the elbow, and bend the arm so as to compress the blood vessels in the elbow; or better, apply a tight bandage above the bleeding point.

To stop *bleeding in the thigh*, make firm pressure upon the femoral artery, on the inner surface of the thigh, or by a tourniquet, as it can be placed about the thigh.

For *bleeding in the leg or foot*, do as for the thigh; or place padding under the knee joint, and bend the knee so the arteries will be compressed. A piece of ice or a very cold cloth applied

¹ See page 18 of color section.



BANDAGING AN EYE

After making several turns around the head, bring the cloth down over the affected eye. Then place turns of bandage over the eye, gradually receding to first position. Fasten with safety pins.

to the part will help to check the bleeding. Cheesecloth or gauze is best, as the red blood cells become entangled in the meshes and the clotting is more rapid.

Hemorrhage in the stomach or the lungs must be controlled by absolute quiet and continuous cold applied over the part. Blood from the stomach, as vomited, is in clots, and has the appearance of coffee grounds. Blood from the lungs, though it may be of mixed contents, is tinged with light red blood, and is frothy.

Bleeding from the nose is best controlled by placing ice or some cold object on the back of the neck and over the nose itself. Sometimes it becomes necessary to plug the nostrils. (See chapter 56.)

Oozing from a bruised surface may be stopped by gentle pressure with gauze or cheesecloth.

Hemorrhage from any part of the body, if in large amount, is accompanied by an anxious expression of the face, pallor, thirst, clammy perspiration, and a feeble pulse.

When hemorrhage has been checked, the lost blood should be replaced by saline enemas and water-drinking.

In case of severe hemorrhage, give an enema of salt solution (one teaspoonful of salt to a pint of water), allowing it to pass slowly into the bowels so as to be retained and absorbed, thus restoring the body fluids.

It is sometimes necessary to give stimulants to a person who has had a hemorrhage, to increase the heart action; but as the increased heart action may dislodge the clot and start up bleeding anew, stimulants must not be given unless very necessary.

In wounds that are at all serious, patients should be kept as quiet as possible, and any measures used to stop the flow of blood should be continued for some time, as blood requires from five to ten minutes to clot under favorable conditions.

In case of gunshot wounds or wounds in the abdomen and chest, a doctor should be called immediately, and all the first-aid-er can do is to prevent the flow of blood from the wound until the doctor arrives. If a portion of the bowel has escaped through a wound in the abdomen, it should not be pressed back until the doctor arrives, because of the danger of infection; but it should be kept moist with a cloth that is constantly dampened with a weak solution of salt and water, to prevent it from drying.



BANDAGING THE HEAD

Make several turns around the head. Then (as shown in the center picture) carry the bandage back and forth over the head, always beginning at the center of the forehead and ending at one point at the back of the head. To hold these in place, make occasional turns around the head. The completed bandage is fastened with safety pins. If the bandage is to remain on long, strips of narrow adhesive plaster will help to keep it in place.



SMOTHERING FIRE IN CLOTHING

Quickly wrap the victim in a rug, a blanket, a coat,—anything at hand — and then roll him on the floor, smothering the flames by pressing the covering tightly about him. Laying the victim on the floor tends to prevent the flames from reaching the head and thus being inhaled.

BURNS

Burns may be caused by contact with fire, or with hot substances, including boiling water and steam, or with certain caustics. They are sometimes distinguished as first-degree, second-degree, and third-degree burns. In the first-degree, the skin is blistered; in the second-degree, the superficial skin is destroyed; in the third-degree, there is more or less destruction of the deeper tissues. The danger depends upon the depth and extent of the injury, the location of the burn, and the age of the person injured.

Treatment: As the agency that produces the burn sterilizes the tissues, antiseptics of any kind need not be used; and further, they are irritating and increase the pain. First apply some kind of dressing over the burned area, to protect it and to exclude the air. In superficial burns, where the skin is not destroyed, and even in cases where there is a slight destruction of the thin epidermis, a saturate solution of picric acid (in water) applied to the area, and covered with a dry piece of cheesecloth or clean linen, will stop much of the pain and hasten the healing process.

If the watery solution of picric acid is not at hand, sweet oil or carron oil (equal parts linseed oil and limewater shaken together to form an emulsion) may be used. Sweet oil and carron oil should be used where there is much destruction of the skin or the flesh.

These are first aid treatments. If a physician can be secured immediately, he may wish to apply a spray of medicated paraffin. Great care should be taken not to permit the burn to become infected when dressing it from time to time.

All severe burns cause more or less shock to the nervous system; and in cases of severe shock, it is necessary to give certain well selected sedatives to the patient. Of course, this must be done by the physician.

A thin paste made of baking soda and water may be used to spread on the burn. Also starch or flour, ordinary vaseline (not carbolized), castor oil, and olive oil may be used. When burns have been caused by strong acids or alkalies (commonly called caustics), such as carboic acid, lye, nitric acid, sulphuric acid, caustic potash, *et cetera*, the parts should be washed off as quickly as possible, best under a water tap. In acid burns, baking soda will neutralize the acid quickly; or limewater or even soapsuds may be used. When strong alkalies have caused the burn, they may be neutralized with vinegar, lemon juice, and the like. Carboic acid is not properly an acid, but a corrosive alcohol; and grain alcohol, if it can be applied immediately, will quickly neutralize it. Great care should be used in removing clothing from a burn, as otherwise the skin and perhaps some of the flesh may be torn away with the clothing.

Precautions: Nearly all burns are caused by carelessness; for example, throwing lighted matches down before they are extinguished; leaving matches where children can play with them; reading in bed by candlelight or lamplight; placing paper shades around electric light globes; placing electric light bulbs in bed for warmth to the feet; placing lamps or candles beneath shelves; hanging clothing too close to a fire; standing too near an open fire; placing hot ashes in wooden boxes or barrels; leaving oily rags about (which cause spontaneous combustion); leaving boiling water where children may upset it; leaving bottles of acid and strong alkalies where children can handle them; keeping such chemicals in the home without proper poison labels; putting hot water bottles in which the water is entirely too hot in a bed. Camp fires, cigarettes, and lighted matches are the causes of many extensive and very destructive fires, which, although they may start with only a match, end in destroying many homes and many lives.

In rescuing persons from burning buildings, remember that open doors and open windows cause drafts that feed the flames. A wet cloth placed over the nose and the mouth will prevent choking by smoke; and the rescuer should crawl backward on the floor, where the best air is, and pull his charge after him. Do not jump from a window except as a last resort. In putting out a fire when it is starting, either beat it out with a broom or heavy clothing, or smother it with blankets or rugs. A good thing to use in the beginning of a fire is a big mop, or a mass of rags firmly fastened to the end of a long handle. This makes a little water go a long way in sopping out fire. Never try to put out a fire caused by gasoline or oil by pouring water upon it. This spreads the fire and does not put it out. Before there is a fire, learn where the nearest fire extinguisher is; and study the subject of fires, their cause, prevention, and control, that you may know just what is best to do in an emergency, when one must think fast and act quickly.

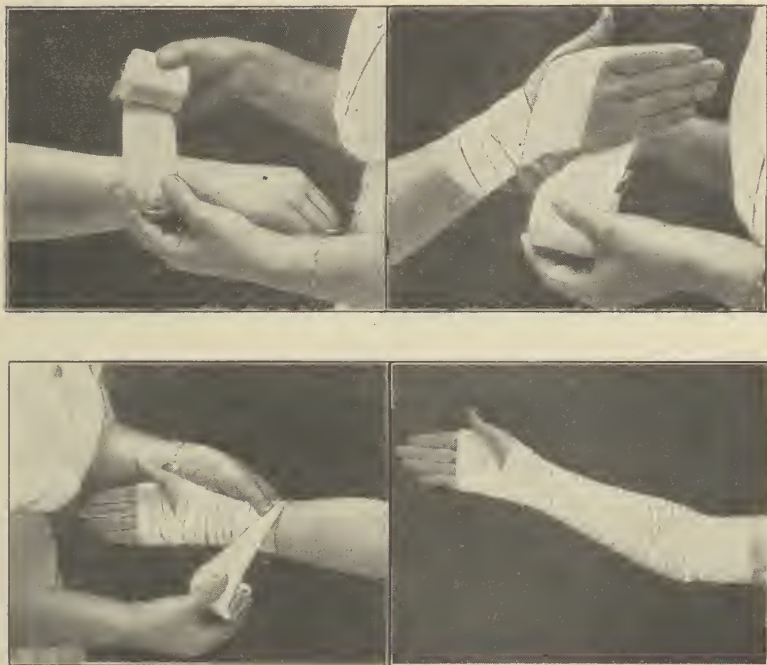
PREVENTION OF INFECTION IN WOUNDS

A wound is an injury in which the skin is broken, with more or less damage to the tissues beneath.

Wounds may be caused by pointed instruments, as nails or ice picks; by sharp instruments, as knives or scythes; or by blunt instruments of any kind.

Puncture wounds are especially dangerous, because the bacteria gaining entrance to the deeper tissues may become sealed in, and some bacteria that are common in the soil produce deadly poisons under these conditions. Puncture wounds should be opened for free drainage, and kept open until they heal from the bottom upward. They may be cleaned with two per cent lysol solution or turpentine or ammonia. Peroxide should *never* be introduced into a wound, as it drives the germs deeper into the tissues, increasing the danger. One half strength tincture of iodine solution is considered the antiseptic par excellence for use in all small scratches, cuts, and other wounds that are not very large nor very deep. Other wounds may be cleansed with two per cent lysol solution, but care must be taken not to carry bacteria deeper into the tissues by using bichloride, peroxide, or what is thought to be clean water.

In case of an industrial wound or a wound in an automobile accident where grease and dirt are ground into the tissues, it has been found that by washing in gasoline, the parts are cleansed; and the gasoline being an antiseptic, and evaporating quickly, the wounds, when properly dressed, heal without infection.



BANDAGING HAND AND ARM

Beginning at the wrist, make turns about the wrist and the hand. Then begin reverse turns and continue to the elbow. Fasten with safety pins.

If no lysol is obtainable with which to bathe the wound, a sterile dressing should be placed on it. If this is not at hand, it is better to leave the wound open than to place in contact with it anything not absolutely sterile.

Adhesive plasters and court-plaster should not be placed over cuts and wounds, because one of the most dangerous germs is the tetanus germ, which grows best where there is no air. When these germs are sealed into a cut with court-plaster, they multiply very rapidly, and cause tetanus, or lockjaw.

It is seldom necessary for a nurse to sew the edges of a wound together. A physician should always be called when possible. However, if a physician cannot be found, and the edges of the wound cannot be approximated without suturing or sewing, the first-aidier may first bathe the wound in two per cent lysol solution, after which the edges should be pressed together, then stitched by using sterilized linen, silk, or silkworm sutures.



BANDAGING FOOT AND ANKLE

Begin above the ankle. After making the bandage fast about the ankle by one or two turns, carry it down around the foot. Then reverse it in ascending turns around the foot and the ankle. Fasten with safety pins.

FIRST AID IN FRACTURES AND DISLOCATIONS

Fractures. There are four classes of fractures of interest to the first-aiders: first, simple fracture, in which one or more bones are broken in one or several places; second, comminuted



SPIRAL BANDAGE OF KNEE

Begin the bandage above the knee. Make reverse turns under the knee. Fasten with safety pins.



SPIRAL REVERSE BANDAGE OF LEG

Begin at the ankle, and, reversing the bandage at each turn, continue to the knee. Fasten with safety pins.

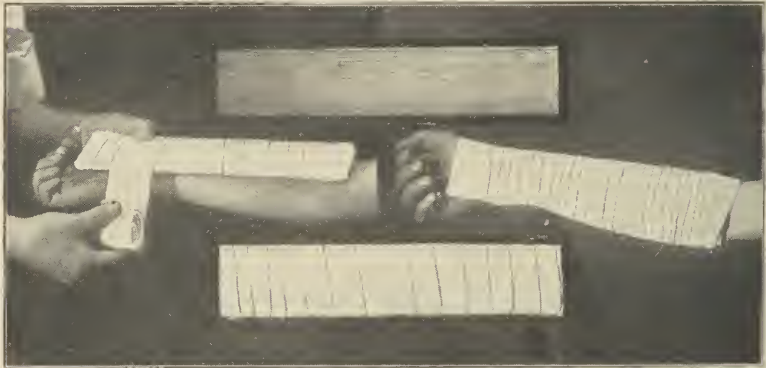
fracture, in which the bone is crushed and thus broken in many pieces; third, compound fracture, in which the bone has been broken and one or more pieces pressed through the flesh; fourth, greenstick fracture, mostly found in children, where the bone is splintered and not broken entirely across.

Symptoms: The signs of fracture are deformity due to displacement of the two fractured ends of bone; crepitation, a grating noise caused by the two ends of bone rubbing against each other; abnormal mobility, or movement at a point where none should be; pain and loss of function (that is, inability to use the part fully).

In simple, comminuted, and greenstick fractures, the parts should be placed at rest and padded in such a way that the broken bones, which are often very sharp and pointed, will not pierce the flesh, thus forming a compound fracture, which is the most

dangerous form. In all cases of simple fracture, an X ray photograph should be taken, that the extent of the fracture may be noted, and information gained which will be most valuable to the physician when he sets the bone.

First aid work consists in first calling a physician; second, stopping hemorrhage, which may be seen in a compound fracture, and carefully applying a splint consisting of one or two light, flat boards to which the part is lightly bound to prevent



A simple method of preparing and applying a temporary support for a broken arm

movement. A pillow may be tied around the part, or a cane or an umbrella may be used in an emergency—anything to prevent the simple fracture from becoming a compound one.

The patient is then placed at rest until the doctor arrives. The doctor will usually place a cast upon the injured member, to prevent the bones from losing their correct position after setting, after which a second X ray photograph should be taken, to see if the reduction is complete. The cast should be kept on about three weeks.

In a compound fracture, if the bone or bones have pierced the flesh and have been withdrawn into the part again, there is almost certain to be an infection because of the dirt and germs drawn into the deeper tissues of the part. These fractures must be very carefully treated by a physician, and a drainage tube inserted to drain off germs and poisons until the body can make the necessary repair.

The part in which a bone has been broken should not be used for three weeks, and it is safer to wait four weeks. Special care must be exercised in fracture of the lower extremities and in

persons advanced in years. The wounds of compound fractures must be treated the same as any open wound where there is every reason to believe that infection is present. *Reducing* of fractures should be done by a physician only, as a perfect knowledge of the anatomy of the parts is necessary. (See chapter 49.)

Dislocations are misplacements of bones in the joints. The dislocations most frequently found are those of the knee, the elbow, the fingers, the shoulder, the lower jaw, and the hip.

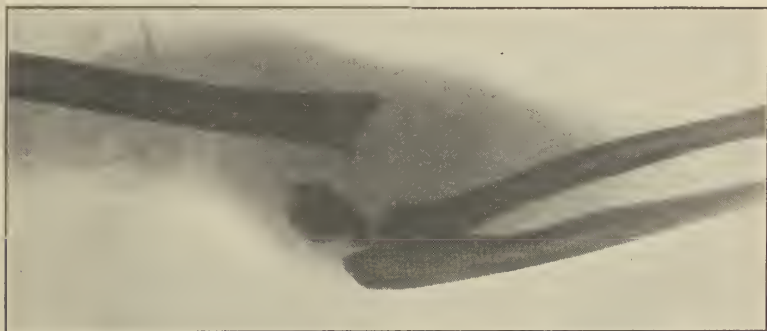
A dislocation of a finger joint may be reduced by steadily stretching the muscles of the finger until the bones slip back into their proper position.

An elbow dislocation also may be reduced by giving careful, steady extension to the forearm until the bones come into place.

When a shoulder is dislocated, the head of the humerus (upper arm bone) may be either forward or backward from its normal position. Place the patient upon his back on the floor, the operator sitting beside the patient and facing his head. Then the operator should insert his heel (the one nearest the patient's body) into the armpit (without shoe on), and give gentle but



A Broken Leg as Revealed by the X Ray



X Ray Photograph of a Broken Arm

firm traction to the arm, pulling the wrist down toward the thigh of the patient. Then carry the arm across to about the center of the body, and release the wrist quickly. This, in nearly every instance, will allow the arm bone to slip back into place.

To reduce dislocation of the jaw, wrap both thumbs well, place them in the patient's mouth upon the lower molar teeth, seizing the outside of the lower jaw with the fingers, and make firm pressure downward and backward. As soon as the jaw starts into place, allow the thumbs to slip off the sides of the teeth to the inside of the cheeks, as the overstretched muscles act like heavy India rubber bands, and bring the teeth together in a very forcible manner. When the jaw has been replaced, a bandage should be applied in such a position as to hold it, and left there for two or three days.

Dislocation of the hip is extremely difficult to reduce, even for a physician who has had long practice. It should never be attempted by a nurse or a first-aider.

In dislocation of the knee, have an assistant lay the patient on the floor, and place his hands in the armpits. The operator should then put enough traction upon the ankle to stretch the muscles of the limb gradually until they become fatigued and allow the bones to return to position. Remember that gentle traction of several minutes' duration will tire the muscle fibers and cause them to stretch much more easily than a heavier traction for a shorter time.



An X Ray Photograph of a Broken Collar Bone

CHAPTER 16

Unconsciousness from Various Causes

WHAT TO DO

The following is a list of the principal causes of unconsciousness:

- | | |
|--------------------|--------------------------------|
| 1. Hemorrhage | 10. Sunstroke |
| 2. Fever | 11. Freezing |
| 3. Fainting | 12. Common shock |
| 4. Heart disease | 13. Electric shock |
| 5. Brain injury | 14. Gas suffocation (asphyxia) |
| 6. Apoplexy | 15. Drowning |
| 7. Epilepsy | 16. Poisoning |
| 8. Alcoholism | 17. Uræmic poisoning |
| 9. Heat exhaustion | 18. Hysteria |

In case of unconsciousness, try first to find the cause; for it has everything to do with the possibility of restoring consciousness. Yet, if the cause cannot be found, every effort should be made to restore consciousness. Be sure to keep the tongue from dropping back into the throat and thus preventing respiration.

1. For "Hemorrhage," see chapter 15.
2. For "Fever," see under the specific form in question.

3. FAINTING

This includes ordinary fainting and red fainting.

Causes: The causes of ordinary fainting are loss of blood, excitement, fright, weakness. The cause of red fainting, so called, is too much blood rushing to the brain. One can see that the two kinds of fainting, being directly opposite in their causes, must receive opposite treatment.

Treatment: For ordinary fainting, first loosen the clothing and lower the head of the patient. Slap him gently in the face with a cold, wet towel, or dash cold water in his face. Let him breathe aromatic spirits of ammonia or smelling salts. Rub the extremities to stimulate circulation. If the pulse is very weak, place over the heart an ice bag covered with a towel. For red fainting, raise the head and apply continuous cold to face and head. Give a hot foot bath. Rub the arms and the legs.

4. HEART DISEASE

Treatment: In nearly all cases of heart disease, the ice bag covered with thin flannel and placed over the heart for fifteen-minute intervals is a most valuable treatment. In unconscious-

ness caused by heart weakness, where the pulse is very rapid, this is the first treatment indicated. The circulation in the extremities must be stimulated by vigorous friction, the cold mitten friction being ideal. Alternate hot and cold over the heart usually gives excellent results.

5. BRAIN INJURY

When a patient is found in an unconscious condition, the first-aider must look carefully for hemorrhage first, then for any injury to the brain or the spine. If the skull is fractured or the neck is broken, and the patient is still living, the utmost care must be used to prevent further injury to the brain and the spinal cord. A physician must be summoned at once, and in the meantime, efforts must be made to make the patient as comfortable as possible. In case of brain injuries, the head should be raised slightly rather than lowered. Of course, if there is hemorrhage, this must be controlled.

6. APOPLEXY

Apoplexy is caused by sudden rupture of blood vessels in the brain. Paralysis may be slight or profound.

Symptoms: Pupils unequally dilated, face flushed and purple, breathing noisy and very rapid, paralysis either of an entire half or of part of a half of the body, and the patient cannot be aroused.

Treatment: Absolute rest, head and shoulders raised, cold application to the side of the head opposite the side of the body paralyzed, warmth to the extremities. The bowels must be kept empty by enemas and purgatives.

7. EPILEPSY

Symptoms: Spasm of muscles for several minutes, in which the hands are tightly clenched. Usually a short shriek or cry precedes the spasm. The patient often bites either the tongue or the cheek muscles. The unconsciousness lasts from a few minutes to several hours. There is often frothy vomiting.

Treatment consists in preventing the patient from injuring himself. Allow him to remain quiet and undisturbed. (See chapter 39.)

8. ALCOHOLISM

Symptoms: Dilated pupils, redness of eyes, muttering, flushed face, rapid, heavy breathing, and odor of alcohol in the breath. This last symptom must not lead one to infer that there is no other cause of unconsciousness; for often some injury may accompany this condition, such as a gunshot wound, a skull fracture, apoplexy, and a number of other conditions. One must always

look for hemorrhage first in any case of unconsciousness, and as before stated, for brain injury and fracture next.

Treatment: The treatment consists in giving large quantities of water, a stomach wash, a cathartic, and an enema. Apply artificial heat to the extremities, cold to face and head, then give a good sweating treatment, followed by a cold mitten friction or a short cold spray.

9. HEAT EXHAUSTION

By heat exhaustion is meant those states of exhaustion, as fainting or weakness, brought on by prolonged and high temperatures. It may be indirectly the result of sun heat, or of working under high temperatures, or of contact with heated objects, such as is experienced by foundry workers and stokers. Those exposed to high temperatures are the ones who are subject to heat exhaustion. This differs from sunstroke, which is due to the penetration of the tissue by light rays that irritate and have destructive effects upon the cells of the body. There are two general causes of heat exhaustion: first, high temperatures surrounding the body, this condition being the most frequent; second, conditions in which there is generated within the body an excessive amount of heat, as acute fever in alcoholic cases and practically all infectious diseases.

Heat prostration from the first of these causes is found among the women in tropical countries who go out to harvest the grains and become exhausted as a result of physical labor and the heated air. It is common also among stokers in the holds of ships, where there are very high temperatures; and among all indoor workers around stoves and furnaces, particularly in hot weather. Diseases like malaria and tuberculosis and other chronic disorders predispose to heat exhaustion. Poor ventilation of rooms, a crowded condition, as in a church or a theater, and the wearing of unsuitable clothing, especially in fleshy people, are potent causes.

Symptoms: The patient becomes giddy, staggers, and falls, the face has a blanched appearance, the pupils become dilated, the breathing is shallow, the skin is cold and clammy, and the temperature is subnormal. There may be only partial unconsciousness or it may be complete. Headache with great prostration is very common. The patient seldom dies unless he is improperly treated, but on the contrary, usually recovers quickly.

Treatment: The first essential is to provide a shady, airy place. Cold water may be applied to the face. The clothing should be loosened about the body. The prostration should be counteracted by stimulants. Ammonia salts should be introduced

to the nose. Alternations of hot and cold over the heart, placing the feet in a hot foot bath, and keeping the extremities warm, are helpful. Giving the patient hot liquids by mouth and keeping him in a horizontal position is necessary. It is well to inquire as to the condition of the bowels, and to cleanse them by the use of warm enemas. Never give a cold bath or a cold spray to a patient suffering of heat exhaustion.

10. SUNSTROKE

Sunstroke is a condition in which the patient is overcome by congestion of the membranes of the brain and nerves through the direct rays of the sun — burning and irritating the cell structures of the body, and thus producing a condition of convulsion and unconsciousness.

Sunstroke is equally common among the strong and the weak. The injury seems to be due to the destruction of the tissues by the sun's rays when the patient is unprotected. One of the explanations for the symptoms is superheating of the blood and congestion of the vessels. Another is expansion of the cerebro-spinal fluid from overheating. The most probable cause is this superheating and expansion of the fluid of the head, causing pressure on the brain. There is paralysis of the nerves, due to their injury by the sun's rays, and inflammation set up by the action of the rays on the membranes covering the brain. It is the ultra-violet rays that burn the meninges and the brain substances.

Symptoms: This condition may follow a march in the sun, when one may develop a headache, with convulsions following, and pass into a semiconscious state, in which there is involuntary urination. The patient may perspire profusely, then turn very pale. The breathing is usually very labored and rapid. The face is generally swollen and of a red-purple color. Complaint is made of constant severe headache, and light hurts the eyes. There is often vomiting; and in fatal cases, death is preceded by a very heavy stupor, in which the breathing is labored and the patient froths at the mouth. The temperature in extreme cases rises to as high as 107° F., and has been known to go as high as 110°.

The more favorable cases will go on to recovery, though nerve exhaustion and headache may cover several weeks of time. In a number of instances, sunstroke has resulted in partial insanity and epilepsy. The symptoms are very similar to those of a severe case of meningitis. There is a very high mortality, ranging from fifteen per cent to forty per cent. The symptoms of heat stroke may not arise till one day to several days after exposure to the

sun's rays, although they oftenest appear immediately on exposure. This condition must be differentiated from alcohol poisoning, delirium tremens, epileptic conditions, meningitis, and from apoplexy caused by a sudden hemorrhage.

Treatment: In tropical climates, great care must be exercised by the new arrivals, to protect the head and the spine from the sun's rays. It is well to wear a helmet made of cork, which can be made much safer with a thin lining of lead. There should be a flat brim extending over the shoulders, to protect the back and the spine. No one should ever risk going out in the sun's rays in the tropics, at any time of day, without a helmet.

A white umbrella with a green lining is also a very great protection. Some of the worst cases of sunstroke have occurred in the English army up in the frigid areas of the Himalaya Mountains. It is the light rays that injure, irrespective of the amount of heat that is produced. White fabric lined with green is the most effective in preventing the ultra-violet rays from passing through. They are absorbed by the green material. It is well also to protect the eyes by amber-colored or green lenses.

The first aid treatment should be to remove the patient to a cool place and loosen the clothing, giving cold water to drink, and bringing down the temperature by cold sponging.

Slightly raise the head, and keep a small amount of covering over the patient, to prevent a draft of air from chilling to a pneumonia. It is well to pack the head in ice, as in the case of meningitis; and where the temperature has a tendency to rise high, give a cold sheet pack. To prevent the suppression of urine by the kidneys, give salt solution by rectum, and encourage copious water-drinking.

To maintain the heart's action, give alternate applications of hot and cold over the heart. Certain heart stimulants have been recommended to aid in tiding the heart over the critical period.

It may be necessary to use artificial respiration when breathing becomes shallow and retarded. Never give drugs to take down the temperature, as they are very dangerous in this condition. It is important, after a person has once experienced sunstroke, to guard carefully against it in the future. He should remove to a climate that is less severe. Every recurrence is more exhaustive, and usually the second or third is fatal.

11. FREEZING

Unconsciousness from freezing is due to the vital depressant effect of long cold. The danger comes when one begins to feel drowsy and the stinging sensation caused by the cold begins to disappear. Those who are addicted to alcoholic liquors die from

exposure to extreme cold much more quickly than those who are not. The reason for this is that alcohol dilates the surface blood vessels, then paralyzes them. In this way, nature is rendered incapable of protecting the internal organs from cold, as it does under normal conditions, by contracting the skin capillaries, and thus forcing the blood away from the surface of the body, to prevent it from losing its heat.

Treatment: In treatment, great care must be taken not to allow heat to come in contact with the body too quickly. In all cases of freezing, heat must be applied very gradually. This is the reason why a frozen ear or a frozen nose should be rubbed with snow or very cold water, the friction bringing blood to the surface, and the part being warmed gradually, to prevent the destruction of tissue which would occur if heat were applied directly to the frozen part. For this reason, the first treatment for anyone who has been exposed to severe cold is plenty of friction in a cool room, with cold rather than hot water. As soon as consciousness returns, some stimulant should be given by mouth, hot coffee probably being the best, and aromatic spirits of ammonia next. The patient must not be taken near a fire nor placed in a warm bath until the circulation in the skin has become active. Warmth may be applied to the trunk of the body more quickly than to extremities that have been frostbitten.

12. SHOCK (COMMON)

Causes: Common shock may result from many causes. Unconsciousness due to shock means that the nervous system has become deranged from one of many causes, the most usual of which are accidents in which there is severe injury, and surgical operations; also some mental states, as from bad news and fright.

Treatment: Stimulate the heart action by alternate hot and cold applications over the heart. Give a hot application for a minute or two, then a vigorous or cold mitten friction to the entire chest. The head must be lowered, the clothing loosened, and the extremities warmed either by hot applications or by vigorous friction.

There is often unconsciousness after a fracture, because of the shock to the nervous system, caused either by the accident itself or by the fracture. The unconsciousness should be treated the same as shock.

13. ELECTRIC SHOCK

Electric shock is caused by contact with an electric current of high voltage, which paralyzes the sense centers of the brain. In electric shock, there is nearly always a burning in addition to shock.

Treatment: Treat the shock the same as common shock, and treat the burn the same as a burn of any other nature. Sometimes it is necessary to rescue a person from a wire through which an electric current is flowing—a live wire. Electric shock occurs most frequently during storms, when electric wires are



Rescuing a Person in Contact with an Electric Wire

broken and either in contact with the ground or hanging low. In these storms, the ground is often wet. If, when found, the victim of the shock is lying upon a live wire, great care must be exercised in rescuing him. The rescuer must not come between the source of current and the patient in such a way as to allow the current to pass through his own body. If he stands upon any dry material, such as dry wood or dry clothing, the current will not readily pass through the body to the ground. Also, if he pulls the patient off the wire by means of a dry rope, dry clothing, or a dry sheet or blanket, there is little danger of his receiving any of the current.

Sometimes the body may be pried from the wire by means of a dry pole or timber. In any case, see that the rescuer is insulated from the ground and from the patient, as already explained.

One of the simplest ways of rescuing a person from such a position is to take off one's coat, if it is dry, two persons grasping the sleeves, pass the coat beneath the body of the patient, and quickly but firmly lift him off the wire. Be very careful that the wire does not swing back and touch his body or any part of the bodies of the rescuers. A dry rope, if at hand, is ideal for this purpose. Use it in the same way as the coat.

14. GAS SUFFOCATION (ASPHYXIA)

Causes: Illuminating gas is largely responsible for cases of gas suffocation, although gases from burning coal and certain other gases are sometimes the cause. The person becomes uncon-

scious, either because of the poisoning effect of the gas, or because sufficient oxygen is not taken into the body.

Treatment: Treatment consists in getting the patient into the fresh air immediately, giving oxygen gas, and restoring consciousness as soon as possible. First loosen the clothing, pull the tongue out by grasping it with thumb and finger covered with a soft cloth or kerchief, then give artificial respiration, and stimulate the circulation of the arms and the legs by vigorous rubbing. This rubbing should be done, if possible, at the same time that artificial respiration is given. All means for restoring consciousness should be kept up until the patient is out of danger or there is absolutely no hope and the patient is known to be dead. (For signs of death, see division on "Drowning," in this chapter.)

15. DROWNING

Treatment: Unconsciousness from drowning may be treated the same as that from gas poisoning, except that the water must be removed from the lungs as quickly as possible, and artificial respiration must be given by the Shaffer method. (See close of this topic.) The advantages of this system consist in the draining of water from the lungs, and in allowing the tongue to fall forward instead of backward, as would be the case in the usual method. As for gas poisoning, remember to keep the extremities warm by heat or vigorous friction, of course removing the wet clothing as soon as possible, and wrapping in warm blankets. Artificial respiration must be kept up for several hours if necessary.

Signs of Death. Usually the breathing stops before the heart action ceases. The signs consist of absence of heartbeat, absence of breathing, and complete paralysis of all muscles (called *rigor mortis*). Absence of heartbeat may be first noted at the wrist pulse. If this is lacking, the carotid artery in the neck should be examined to see if any pulsation can be felt. Then the ear should be placed close to the space between the fifth and sixth ribs, about three inches to the left of the center of the chest, to listen for the apex beat. The breath may be tested by holding a cold mirror over the mouth and the nose. The slightest respiration will show as moisture on the glass. In nearly every instance, the body begins to cool and the muscles become rigid some little time after actual death occurs.

Artificial Respiration. For certain conditions of unconsciousness, artificial respiration is indicated; and for this, we describe the Shaffer method, because it can be carried out by one person and effectively carried out without fatigue. Before



The Shaffer Method of Artificial Respiration

artificial respiration is begun, a patient overcome by smoke or gas should be quickly removed to good air, the clothing loosened, and foreign bodies removed from the mouth; and it may be necessary to draw the tongue forward, to be sure that all obstructions to breathing are removed.

While reviving the patient, see that some one at the same time is sent for dry clothing, blankets, and other articles necessary for the comfort of the patient. The first step is to place the patient with face downward and to one side, the arms stretched out over the head. Then kneel astride the patient's thighs, with the hands over the sides of the chest, just below the shoulder blades, the tips of the fingers reaching well around the lower chest. Now stiffen the arms, and gently throw your weight at

the chest by leaning forward. This expels the fluids and the air from the chest. Now quickly release your pressure and swing backward. This allows the air to fill in the chest. Repeat this movement about eighteen times a minute. Do not feel content until you have kept up this procedure for an hour, unless a physician should come before that time. One may stop for a brief interval to see if the patient is breathing naturally.

16. POISONING

In unconsciousness from this cause, the poison itself must be treated promptly. (See chapter 17.) Then if the patient still remains unconscious, treat as for shock.

17. URÆMIC POISONING

Symptoms: Pin-point pupils, heavily coated tongue, odor of urine on the breath, subnormal temperature, cold, clammy skin, puffing of the eyelids, and swelling of the ankles.

Treatment: This condition, which comes on gradually, must be treated by a physician. General treatment consists in hot packs, cathartic, hot drinks, hot enemas. In all cases of kidney disease, the skin must be kept particularly active, that it may relieve the kidneys of as much work as possible.

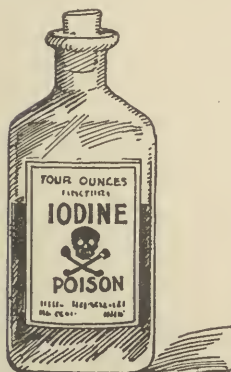
18. CONVULSIONS OF HYSTERIA

This is distinguished from epilepsy and the convulsions following the accidental or intentional taking of poisons, by the fact that the patient takes great care not to hurt herself. Treatment consists in part in withholding sympathy, as the recovery is prompt when the patient finds that her condition alarms no one.

For general treatment of one so affected, see chapter 39.

Poisoning

Few there are, apart from well qualified physicians, who can hold in memory the proper antidotes and remedies for the various kinds of poisons with which humanity may be afflicted, intentionally or otherwise. At such times, both wise and instant action is demanded. The outline that follows is simple and can be memorized. More specific instruction regarding poisonous substances is given later. But do not forget to send for a physician first of all, if possible. While awaiting his arrival, give promptly first aid.



Poison bottles should be properly labeled.

THREE GENERAL CLASSES OF POISONS

1. Corrosive poisons.
2. Irritant poisons.
3. Nerve poisons.

CORROSIVE POISONS

Corrosive poisons produce instant burning effect, staining lips and mouth, with burning pain in mouth and throat and stomach. There is straining, vomiting, and shock, sometimes suffocation. Examples are strong acids and strong alkalies, as lye, ammonia, hydrochloric and sulphuric acids.

Treatment: *a.* Neutralize the poison. *b.* Dilute the poison and soothe the parts. *c.* Give stimulant.

a. For the strong acids, as sulphuric, hydrochloric, and nitric, neutralize the poison with plaster from the wall, magnesia, baking soda, soapy water, and slightly beaten white of egg. If strong alkalies, neutralize with vinegar, lemon juice, or weak hydrochloric acid. Carbolic acid is a corrosive poison, but should not be treated as an acid. It is only called an acid because it is corrosive. To neutralize carbolic acid, give weak alcoholic solutions, such as brandy, diluted whisky, diluted alcohol, also slightly beaten white of egg.

b. For both acids and alkalies, large quantities of oil may be given, or milk, flour and water, water alone, or white of egg slightly beaten.

c. For stimulant, give a teaspoonful of aromatic spirits of ammonia in a glass of water, or strong tea or coffee. Keep the patient warm by application of external heat. Black coffee may be given by rectum.

It is best not to use a stomach tube for corrosive poisons, as the parts have been so softened and eroded by the caustic, that the stomach tube is very likely to puncture through the esophagus. Always neutralize these corrosive poisons as soon as possible.

IRRITANT POISONS

Irritant poisons irritate, but do not corrode. There is no stain. Like the corrosive poisons, they cause burning of the mouth and the stomach, straining, and vomiting. Shock also is present. They usually give a metallic taste. Common examples are oxalic acid, wood alcohol, silver nitrate, naphtha, phosphorus, lead.

Treatment: a. Give an emetic or wash out the stomach. b. Dilute the poison and soothe the parts. c. Give stimulant.

a. Give any emetic, such as sirup of ipecac, mustard water, or quantities of dish water, the latter being good because of its soap and grease.

b. Dilute and soothe the same as for corrosive poisons, except that in phosphorus poisoning, use *no* oil.

c. Stimulate the same as for corrosive.

NERVE POISONS

Nerve poisons are divided into two groups.

The first group consists of *sleep producers*, such as opium, morphine, soothing sirups, paregoric, and laudanum.

Treatment: a. Give an emetic and wash out the stomach with water and tea. b. Dilute the poison with large quantities of water. c. Keep the patient awake.

To keep the patient awake, give strong coffee. Slap him with a wet towel, shouting in his ears. If he is not too weak, walk him up and down, giving support. Keep him warm. If breathing stops, give artificial respiration. Persist. Keep the patient awake. A minute's slumber may be fatal.

The second group is made up of convulsants, such as strychnine, belladonna, and prussic acid.

Treatment: a. Give an emetic and wash out the stomach with water and tea. Act quickly. If an emetic is not at hand, place the finger in the throat, and keep it there until vigorous vomiting occurs. b. Dilute the poison by giving large quantities of water, *et cetera*. c. Give artificial respiration if necessary; then rest and absolute quiet. Keep the patient warm.

It will be seen that in this outline, the main point for the first-aid to remember is, for all the poisons except the corrosive poisons, first, to give an emetic; second, to dilute the poisons and soothe the parts; third, to stimulate when necessary. For the corrosive poisons, the one difference is that an emetic must not be given, but the acid poisons must be diluted with weak alkalies, and the alkaline poisons with weak acids. If a stomach tube is at hand, use it in all cases except for the corrosive poisons and phosphorus.

MERCURY

Bichloride of mercury (corrosive sublimate) is found usually in the form of disinfectant tablets, but often corrosive sublimate powder is kept in the medicine chest for use in poisoning insects and rodents.

Symptoms: Metallic taste, burning pain in the stomach, vomiting, perhaps diarrhea; later, much irritation of the kidneys, and if the dose has been a heavy one, death in a week or ten days.

Treatment: The white of one egg, beaten in a cup of water, for each four grains of bichloride taken. Milk is an antidote, and should always be taken. It never does any harm in any kind of poisoning, is nearly always at hand, and will help in most cases. Empty the stomach with a stomach tube as soon as possible. Wash the stomach out well, and give a large dose of Epsom salts, followed with copious water-drinking. Afterwards give plenty of milk. Give stimulant if necessary. All mercury compounds, with other poisons, should be carefully labeled and kept under lock and key.

CARBOLIC ACID

This is not really an acid, but a corrosive alcohol.

Symptoms: Lining of mouth cooked white, pupils of eyes small, urine dark and scanty, pulse feeble, temperature low.

Treatment: Rinse the mouth with pure grain alcohol. Give freely of well diluted grain alcohol, whisky, or brandy. If alcohol cannot be had, use Epsom or Glauber's salts. Beaten white of egg is highly recommended for carbolic poisoning. Allow free water-drinking, to dilute the poison. Give stimulant. Keep the patient warm. Empty the bowels by clear enema, and follow with a coffee enema to be retained.

LYSOL

This is manufactured from coal tar oils and mixed with liquid soap.

Symptoms: Like those of carbolic acid, only less severe.

Treatment: Give an emetic or use a stomach tube. Give Epsom or Glauber's salts. Wash the stomach freely with water, to dilute the poison. Give milk. Keep the patient warm, and administer stimulants.

ARSENIC

This is found in fly poisons, rat poisons, Paris green, corn cures, Fowler's solution, *et cetera*.

Symptoms: Great thirst, vomiting of bloody mucus, bloody stools, cold extremities, inflamed eyes, convulsions followed by paralysis and collapse.

Treatment: Give an emetic or use a stomach tube. Antidote with magnesia, beaten eggs, or castor oil. Dilute with large quantities of water. Stimulate as for carbolic acid poisoning.

HEADACHE POWDERS

These usually contain acetanilide.

Symptoms: Livid face and limbs, profuse perspiration, pulse slow and weak, shallow breathing.

Treatment: Give an emetic or a stomach wash. Dilute with large quantities of water or milk. Give castor oil for cathartic, combined with enema. Stimulate with strong coffee by mouth or by rectum. Keep heat to the extremities, and an ice bag to the heart. Give artificial respiration if necessary.

STRYCHNINE (NUX VOMICA)

Symptoms: Very severe convulsions, cramping of muscles of body, bowing of back, locked jaws. The patient is conscious to the end.

Treatment: Give an emetic. If none is right at hand, produce vomiting by running a finger down the throat. Have the surroundings quiet, and apply heat to the extremities and the spine, or give a hot bath. Antidote by giving powdered charcoal in large quantities. Follow with a second emetic.

PHOSPHORUS

This poison is found in matches, rat poisons, and vermin killers.

Symptoms: Pain in stomach, vomiting, skin dark with odor of phosphorus, bleeding from nose, bloody purging, and convulsions.

Treatment: Give a half ounce of Epsom salts in a tumbler of water. A dilute solution of potassium permanganate acts as an efficient antidote. Magnesia may be administered. Dilute with soothing liquids. Fats and oils *must not be given*.

OPIUM

Laudanum, morphine, codeine, paregorie, soothing sirups, and cough mixtures.

Symptoms: Drowsiness to unconsciousness, pinhead pupils, face flushed or purple, slow respiration—6 to 10 a minute.

Treatment: *a.* An emetic or a stomach tube, followed by a cathartic (saline). *b.* Dilute with large quantities of water. *c.* Give stimulants—plenty of strong coffee, or a teaspoonful of aromatic spirits of ammonia in half a glass of water. Walk the patient, unless he is too much fatigued. Slap with cold towels. Give artificial respiration if necessary.

LEAD

Lead is used extensively in the arts and the manufactures, over one hundred industrial processes requiring lead or one of its salts; and as a result of carelessness in handling, it is frequently the cause of severe intoxication. Among the commoner occupations in which lead is handled are lead mining, the manufacture of porcelain and pottery ware, painting, dyeing, plumbing, and the manufacture of pigments. Lead pipes are occasionally used for conveying drinking water. This is a source of danger of lead poisoning. The purer the water, the greater the danger, especially if it contains plenty of carbon dioxide and oxygen. Hard water would be even more dangerous but for the fact that a deposit is soon formed on the inner surface of the pipe, preventing further action. Poisoning has resulted from the action of fruit and vegetable acids on solder used on cooking utensils and in sealing cans. Sometimes lead salts are taken by mistake, or for suicidal purposes. Fortunately, however, this is rare.

To prevent lead poisoning, the worker must diligently watch his personal habits, and cultivate cleanliness to the highest degree. He should rinse the mouth and the throat, wash the hands and the face, and clean the nails, before eating. Care must be taken not to allow the lunch to come in contact with the clothing, and it should never be eaten in the works. The workman should change his clothing before leaving the premises. In those manufacturing processes where the air is laden with dust, respirators should be used.

Symptoms of Acute Lead Poisoning: There is first a sweetish, then a puckering metallic taste, with a burning that extends from mouth to stomach. Vomiting, with abdominal cramps, may come on within a few minutes, or may be delayed several hours. There may be constipation or diarrhea. Thirst is unquenchable.

Severe cases show early signs of collapse—weakness, slow pulse, mental dullness. Fatal cases become unconscious, and may go into convulsions.

Treatment: Epsom salts should be given by mouth, and the insoluble lead salts should be removed, preferably by stomach tube. Repeat the treatment several times, then give a good dose of castor oil—two to four tablespoonfuls. Keep the patient warm. Hot applications will help to relieve the pain.

Symptoms of Chronic Lead Poisoning: The onset is very insidious. The symptoms may not develop for weeks and even months after the patient has stopped working with lead. The first signs are generally vague manifestations of poor health. The patient is pale, has a bad breath, poor appetite, indigestion, loss of flesh, and occasional attacks of nausea and vomiting. He notices that he is growing progressively weaker, and complains of rheumatic pains. As the condition advances, there are severe attacks of colic and constipation. The muscles of the forearm that extend the hand, become gradually paralyzed. He may develop symptoms of insanity. One of the earliest signs of chronic poisoning is the so-called lead line. It is a slate-colored line appearing where the teeth meet the gums.

Treatment: Restoration of general health by rest, under the best of hygienic conditions. The pain is relieved by hot applications and hot baths. Constipation is relieved preferably by enemas, as cathartics tend to increase the abdominal distress. Paralysis may be treated by massage and electricity.

WOOD ALCOHOL

Wood alcohol is used extensively in the arts, and is consequently a possible source of accidental poisoning. It is frequently used in the manufacture of cheap liquors; and in many instances, the percentage of wood alcohol in a liquor is so high as to cause death. Wood alcohol should never be applied to the body, internally or externally. It should not be used for rubs. The grain alcohol alone should be utilized for this purpose. In the use of wood alcohol, care should be taken not to inhale the fumes.

Symptoms: The intoxication following the taking of wood alcohol, at first resembles ordinary alcoholic intoxication. It is a stronger local irritant, however; and the mucous membranes of mouth, throat, and stomach burn with a fire that is not quenched by water. The symptoms of poisoning may come on at once, or they may be deferred several days. There is great abdominal pain, nausea, vomiting, dizziness, and headache, with increasing general weakness. If the case is serious, the patient

may become delirious, and gradually sink into a comatose state. The temperature drops, and the patient becomes cyanotic (bluish), and death follows from respiratory failure. Incurable blindness often follows recovery from the acute poisoning.

Treatment: If poisoning is suspected, empty the stomach. Keep the patient warm, giving hot applications for pain, and strong, hot coffee as a stimulant.

NAPHTHA POISONING

Gasoline has been accidentally drunk for alcoholic beverages with more or less serious results. The fumes of petroleum products used in cleaning clothes, frequently cause the user to faint. It is not known whether permanent damage is done by continued inhalation of gasoline fumes or not.

Symptoms: The symptoms produced by the taking of petroleum, or the products of its distillation, are severe burning in the mouth and the stomach, vomiting, great prostration, feeble pulse, skin cold and moist, thirst and restlessness, and finally unconsciousness. The cause of the symptoms can be readily recognized by the odor of the breath and of the vomited matter.

Treatment: The stomach should be emptied and washed out thoroughly. A stomach tube is preferable. Keep the patient warm, using bottles, bricks, or stove lids. The vital functions may be stimulated by the use of strong, hot coffee. A good recovery is usually made.

FOOD POISONING

It is estimated that each year, fifteen to twenty thousand persons in the United States are victims of serious outbreaks of food poisoning. A small percentage of these cases prove fatal. Many more thousands are beset by temporary and slight upsets, due to the same cause. The fact that the majority of these cases are not serious does not minimize the danger of food poisoning from a public health standpoint.

An intoxication from the presence of poisons in the blood, or an infection from the presence of injurious germs in the system, even though promptly overcome and eliminated by the defensive mechanism of the body, is certain to accomplish permanent injury. The cumulative effect of many slight attacks, or the insidious progress of an injury resulting from constantly taking into the body small quantities of mineral or organic poisons, ultimately means degenerative changes, noticeably involving kidneys, liver, blood vessels, and heart. The seriousness of these

increasingly prevalent diseases makes the question of food poisoning of sufficient importance to demand the attention of every individual.

Causes: Food poisoning is caused by injurious constituents in the food eaten. It may be a poison naturally produced by a plant or animal that is mistaken for food, as certain varieties of mushrooms, or certain fish especially abundant in tropical waters. Again, it may be the toxin (poison) elaborated by germs with which the food is contaminated, the germ being killed before or immediately after entering the body, the toxin alone causing the injury. More frequently the type of germ with which food is contaminated, is capable of development in the human body, and is the agent producing the symptoms. Finding the person a favorable environment for the growth of its kind, it multiplies, and germs are distributed throughout the body. This is infection. Each germ produces a toxin, which poisons the victim.

MUSHROOMS

There are two definitely poisonous varieties of this fungus, *Amanita muscaria* and *Amanita phalloides*, each producing distinct symptoms, and each often confounded with the varieties suitable for food. An expert's opinion on whether a mushroom is good for food or not is not always safe, for the records bear many accounts of the mistaken judgment of those who consider themselves qualified to decide. The first variety, *Amanita muscaria*, contains a poison known as muscarine, which attacks the nerve centers in the brain and the spinal cord.

Symptoms: Within fifteen to thirty minutes after eating the mushrooms of the first variety, the individual begins to note dizziness, double vision, difficulty in swallowing, general weakness, and within a few hours, blindness. He may become unconscious and go into terrific convulsions. In spite of vigorous treatment, death usually ends the awful picture within twenty-four hours.

The majority of cases of mushroom poisoning are caused by the *Amanita phalloides*, but the symptoms do not come on as quickly as in the case of the *muscaria*, from six to fifteen hours elapsing before any evidence of poison is noticed. They are all referable to the stomach and the bowels. There are griping pains in the abdomen, vomiting, diarrhea, with mucous and even bloody stools, and great thirst. In fatal cases, the patient gradually weakens and finally becomes unconscious and dies. There are no convulsions. The person poisoned should be immediately placed under the care of a physician. The first aid, as indicated for the other variety, applies here.

Treatment: While awaiting the arrival of a physician, empty the stomach and purge the bowels. Keep the patient warm. Strong coffee may be given as a stimulant. Atropine is the antidote used in combating the effects of the muscarine, but it must be administered by a physician.

The mortality in mushroom poisoning is high, running from sixty to one hundred per cent. Recovery is possible only when the cause of the sickness is early recognized and eliminative measures are promptly applied.

INFECTED FOODS

Food is frequently infected by handling. Epidemics of typhoid fever, cholera, scarlet fever, diphtheria, and tonsillitis have been known to have their origin in food contaminated by those having the disease, or by those carrying the germs of the disease. Tuberculosis also has been transmitted in this way.

The commonest cause of poisoning from diseased meat is the presence in the food of a germ known as the bacillus enteritidis, and some of its very close relatives. It receives its name from the fact that its chief activities are localized in the intestine. An animal may be infected by this organism, and if the portion utilized as food is not very thoroughly cooked, the infection will be transmitted to the human. In the animal tissues infected by this germ, a poison has been liberated, which is not destroyed by heat. Thus thorough cooking of infected meat will not always suffice as a protective measure against food poisoning. Meat thus infected may give no visible evidence of its condition. Many beeves passed by the inspector, have caused serious epidemics.

As a matter of prevention, meat should always be thoroughly cooked. The use of rare meat is dangerous. The use of raw sausage is especially fraught with danger. The liver and the kidneys are much more likely to be diseased than the muscle, and should consequently be discarded as food. By far the safest way is to dispense with flesh foods entirely. Disease in cattle, sheep, and hogs is greatly on the increase; and inasmuch as flesh food is not essential to the proper nourishment of man, a needless risk is taken in using it.

Vegetables and fruits may be contaminated in handling or in raising, and occasionally are the source of an outbreak of disease.

The symptoms of poisoning with infected foods are nausea, vomiting, diarrhea, abdominal pain, and general weakness, coming on at any time from one half hour to twenty-four or even forty-eight hours after eating. There is usually some fever. The patient may make a quick recovery—two to four days; or the disease may drag along for weeks, and may be fatal.

Treatment: The first thought, when symptoms are present, is the evacuation of both stomach and bowels. Keep the patient warm and quiet in bed.

BOTULISM

Still another type of poisoning from infected food is botulism. This is now known to be due to a germ called the bacillus botulinus, which may grow and develop in almost any kind of food that has been inadequately prepared for keeping. Practically all cases reported are from foods that have been smoked, pickled, or canned, and then allowed to stand.

The germ cannot grow in the human body, but dies soon after entrance. The symptoms are produced by the poison formed by the germ before the food was eaten. The poison, however, is destroyed by heat. Consequently canned meat and vegetables, if thoroughly heated, will be rendered reasonably safe. It has been noted that home-canned meats and vegetables are more likely to be a source of danger from this cause than those commercially prepared. This is because foods canned on a large scale, are cooked by steam under high pressure, and all germs are killed. The poisonous food may be in no way altered in appearance, and no suspicion may be aroused. Frequently, however, it will have developed a rancid or acrid taste.

Symptoms: The symptoms of botulism develop very slowly, beginning several hours after eating. The poison attacks the nervous system. There will be dizziness, double vision, difficulty in chewing and swallowing, and general weakness. There may or may not be nausea, vomiting, and diarrhea. Seldom is there any abdominal pain.

Treatment: Empty the stomach and purge the bowel, by both enemas and Epsom salts. Keep the patient warm, with hot water bottles, hot bricks, or hot irons.

Prevention: Prevent botulism by rejecting all suspicious foods. Reheat all canned goods before using. Do not allow raw materials composing salads to stand too long before being served.

Unless food has been infected by one of the several organisms named, putrefactive changes do not render it dangerously harmful. The preparation of cheese is based upon decomposition by certain types of germs, and the flavor depends upon the germ utilized. All fresh meat undergoes a degree of decomposition before being regarded by many as fit for use. Only when fruits and vegetables are contaminated by some of the highly dangerous germs do they produce serious trouble. The eating of spoiled fruit may set up a little local irritation; but this is not food poisoning. Still, the use of foods that have been subject to putre-

faction is unwise. The Creator has provided a great sufficiency of clean, wholesome, unquestionable food, and the appetite should be trained to appreciate this type of nourishment.

SNAKE BITES

These are uncommon in the United States, but of very common occurrence in such countries as India, Africa, and South America.

Treatment: Tie a cord, a handkerchief, or a bandage immediately above the part bitten, if that part is one of the extremities. This checks the return of blood toward the heart, and thus helps to prevent the absorption of the poison. If potassium permanganate crystals are at hand, rub them into the wound immediately. Sometimes a saturate solution of this chemical is introduced directly into the wound by a hypodermic syringe. Free bleeding should be encouraged. If the potassium permanganate cannot be procured immediately, the wound may be sucked by one whose mouth has no sores or cuts in it. Strong ammonia may be used to cauterize the wound. Stimulate the patient with a teaspoonful of aromatic spirits of ammonia in half a glass of water, and repeat as often as necessary. Large amounts may be given without danger to persons bitten by poisonous snakes. Leave the cord or bandage above the wound in place as long as practicable, but not longer than one hour. Loosen it gradually, consuming ten or fifteen minutes in the process. Place the bandage on again quickly if severe depression follows the loosening of it, but put it on in a new position if possible. In addition to the stimulant suggested, strong coffee may be given, and the circulation of the extremities must be kept up by vigorous rubbing.

SPIDER BITES

In spider bites, the treatment consists in providing for free bleeding of the part, and cauterizing with something like carbolic acid or permanganate of potash or strong ammonia water. If cocaine can be obtained quickly, it is valuable in neutralizing the poison and relieving the pain. Wet salt and wet earth are good applications for insect stings and spider bites.

INSECT BITES

The bite or sting of an insect is accompanied by the injection of an acid fluid that is decidedly irritating in most cases.

Treatment: Remove the stinger, if one is left. Immediately apply an alkaline substance, such as ammonia water or soda. If these are not at once available, apply soap liberally, or split an onion and place it on the part. The object of this is to neutralize the acid poison injected, before the swelling, which is bound to occur, has closed the minute opening made by the bite.

CHAPTER 18

Miscellaneous Ailments

INGROWING TOENAIL

A condition in which the flesh under the edges of the nail of the great toe becomes tender and often inflamed, owing to the overgrowth of the nail, or pressure of the flesh against it.

Causes:

1. Shoes that are either too short or too narrow across the toes are usually responsible for the trouble. High heels may cause the same difficulty, by throwing the foot forward so that the toes are pinched in the pointed front of the shoe.

2. A faulty method of trimming the nails of the great toes. A nail should be cut straight across, not rounded at the corners to follow the curve of the toe. The flesh crowds in at rounded corners, and when the nail pushes forward in its normal growth, it presses into the flesh.

Treatment:

1. Remove the cause.

2. Apply adhesive plaster, drawing it around the under side of the toe in such a way as to pull the flesh back from the edge of the nail.

3. Gently pack a strip of oiled cotton or lint under the buried edge of the nail.

4. If the toe is inflamed, alternate hot and cold foot baths would be acceptable.

5. The following is effective in giving relief if the sore is not too far advanced (greatly inflamed and suppurating): Cut a longitudinal groove in the nail, as near the sore side as possible, and in depth as near the quick as is safe without risking infection. In other words, do not draw blood. Nature's effort to fill that groove relieves the sore side.

6. If satisfactory results are not obtained after a reasonable trial of the home treatments, a slight operation by a physician will effect a cure. If, however, the cause is not permanently removed, a return of the affliction may be expected.

CHILBLAINS

A condition affecting exposed parts, oftenest the hands and the feet, sometimes the nose and the ears, and characterized by redness, burning, itching, and tenderness, and in some instances, with chapping and ulceration.

Cause: Exposure to damp cold. The blood is driven out of the terminal arteries of the part by exposure. On warming, the blood vessels enlarge so greatly that they allow the blood to stagnate in the part, giving rise to the redness, swelling, pain, and itching. One attack renders the tissues more susceptible to a repetition, and the injury sustained results often in a more or less chronic affliction. It occurs with less frequency and severity in adults than in children, and for this reason, commonly receives less attention than it really deserves when the little ones are attacked.

Prevention: Those who are susceptible should avoid cold, even moving to a milder climate if the condition has become chronic. They should conserve the sources of heat by clothing the body warmly. The extremities should receive special attention. Use should be made of long woolen sleeves, cloth or leather gaiters, and high shoes. It should be remembered that tight gloves or tight shoes worn in cold weather will, by reason of local pressure, help precipitate an attack. Cold sponge baths and systematic exercise should be a part of the daily program.

Treatment: Secure proper warmth by clothing and exercise. Change garments that have become moist by perspiration. Keep the affected parts dry during the day, reserving all medicinal applications for night.

1. Alternate hot and cold immersion for twenty minutes. Dry without rubbing, then apply one of the following prescriptions:

a. A LOTION

Lead acetate	16 grains
90% alcohol	1 ounce

b. AN OINTMENT

Oil of wintergreen	2 drams
Menthol	15 grains
Lanolin	1 ounce

c. DUSTING POWDERS

Boric acid	50 parts
Powdered talc	25 parts
Starch	25 parts
Menthol	15 grains

d.

Calamine	7 parts
Menthol	1 part

2. Relief may be obtained by the following measure: Immerse the part in water as hot as can be borne, containing one teaspoonful of alum to the gallon. Remove after five minutes, give a cold pour, and dry.

3. If the chilblains are broken, cleanliness in their care must be observed. Five per cent carbolic acid in vaseline makes a

good antiseptic ointment. The area should be protected by gauze. If the skin breaks, a covering of flexible collodion may safeguard it.

FROSTBITE

The vulnerable points for this unpleasantness are the nose, the ears, the chin, the fingers, and the toes. The numb, shrunk, bluish-hued, tingling member gives unmistakable evidence of the injury.

Treatment: The essential idea is to bring about a gradual return of the normal circulation to the affected part. If it is restored too quickly by sudden warming, a violent inflammation will result, and the tissue may die. It may be wise, therefore, to care for the patient in a cold room. The time-honored remedy is the rubbing of the part with snow. A better and more rational method is, to bring the patient into a comparatively warm room and cover the part with a cloth wet in cold water. When the circulation has been restored, rub with alcohol and water, equal parts, wrap the member in absorbent cotton, and elevate. Warm the patient with hot drinks. Until recovery is complete, keep the part anointed with vaseline or cold cream, and protect it by cotton. If it blisters and a sore develops, treat it as a burn.

NAIL INFLAMMATION (PARONYCHIA)

This term signifies an inflammation, with pus formation, beneath the skin at the base or root of the finger nail. In most cases, it is limited to a single finger; but it may involve several or all of them. Indeed, it may extend into the deeper tissues, and even pass up the arm. The symptoms are pain and extreme tenderness, well localized at the site of the trouble, with the formation of pus.

Cause: General physical debility. An early evidence of lowered vitality is the appearance of hangnails. These tags of skin are pulled off, leaving at times a raw, exposed surface. The resistance being lowered, the part becomes infected by disease germs. They bury themselves in the skin, sometimes under the nail, and soon the finger becomes red, swollen, hot, and very tender. It throbs and gives one no rest. Later a little white patch indicates the formation of pus.

Treatment: Soak in hot water. If pus forms, sterilize a needle in a flame, and pick the little abscess open. If it has localized beneath the nail, the services of a physician may be necessary. Close attention to personal hygiene is an impor-



Paronychia

tant factor in the care of these cases. The general health must be built up by proper diet, exercise, rest, and habits of life. For a discussion of *felons*, see chapter 70.

ANAPHYLAXIS

A condition resulting from the violent efforts of the body to rid itself of the presence of a substance, usually protein in nature, that has gained entrance to the blood stream, and to which the body is peculiarly susceptible. It is characterized by hives, sometimes purging, vomiting, fever, and asthmatic and hay-fever-like attacks.

Cause: Some persons, nobody knows why, respond in an abnormal manner to certain substances to which they may be exposed through the presence of these substances in the air they breathe, in the food they eat, or in something they may have brushed against. These same substances may be harmless to the other members of the family. Such an individual is said to have an idiosyncrasy, or idiosyncrasies,—as the case may be,—in that they are highly sensitive to the contact of the substance or substances responsible for the symptoms manifest.

There are a variety of diseases which, in a certain proportion of persons suffering of them, may be directly attributed to such idiosyncrasies. Hay fever and asthma; acute gastrointestinal upsets, especially in children; eczema, hives, and other forms of skin affections, may be listed as prominent examples. Occasionally a single individual may suffer at different times from all these conditions. It seems that the idiosyncrasy may actually run in families. For example, the male members of one family for four generations were subject to attacks following the eating of eggs.

Among the responsible agencies affecting these individuals may be mentioned various pollens from plants,—ragweed, timothy, nasturtiums, and so forth. The emanations from cats, dogs, and horses, and from the feathers in pillows, and the ingestion of such foods as milk, eggs, fish, and fowl, and in children, some of the cereals and butter, will give rise to a terrific upheaval.

Treatment: Stop all food and administer a laxative. (See chapter 12.) The itching may be allayed by a soda wash, or the application of a one per cent carbolic acid solution. Those who suffer repeated attacks and are unaware of the possible causative factor, may secure the services of a specialist in almost any well equipped hospital, who, by certain harmless and painless tests, may be able to determine the cause, and in many cases, immunize the patient against it, thus effecting a cure.

Some persons have a very remarkable susceptibility to serum derived from a horse; and as this material is used as the antitoxin in the treatment and prevention of diphtheria, attention should be called to this fact. Anyone who is known to have attacks of asthma set up by contact with horses should be handled with great care in the administration of antidiphtheritic serum or other serums. There have been a few cases of death from this cause. (See chapter 44, under "Diphtheria.")

HARELIP AND CLEFT PALATE

These deformities are not hereditary, and contrary to popular belief, are not the result of emotional crises, frights, or what not, to which the mother may have been exposed while carrying the child. Up to a certain stage in the development of the child, all palates are cleft and all lips ununited. Occasionally the space fails to be bridged by growing tissue; but that failure cannot be associated with the fact that the mother had passed a person on the street who had a harelip. This is pure superstition. These deformities can be cured, and almost all evidence of their existence effaced, by early and skillful surgery.

HERNIA

In general, a person with a hernia was born with a weak spot in the abdominal wall. As he grows older and is called to perform muscular labor, the vulnerable spot presents a slowly enlarging opening, until finally a knuckle of small intestine protrudes. Unless protected, the condition will grow progressively worse.

In mild cases, a well fitted truss is quite satisfactory. However, it is a great bother. The most satisfactory treatment is surgical. Once efficiently repaired, hernia gives no further trouble.

There is danger in allowing a hernia to go without attention. Not infrequently a loop of intestine that has pushed its way through the abdominal wall becomes pinched, and the passage of material through the intestine is stopped. This is called a *strangulated* hernia. When this happens, prompt interference alone will save the life of the patient. The symptoms are unmistakable — pain, vomiting, and abdominal distention. A physician should be called at once in a case of this kind. If one is not immediately available, the patient should be placed on a bed, with his hips and legs or the foot of the bed well elevated, and an effort should be made, by very gentle massage, to work the loop of intestine back through the opening and into the abdominal cavity. Sometimes, if the patient is placed in a hot bath, the heat will

produce a relaxing effect that will permit the replacement of the loop of intestine.

HICCOUGH

This annoying symptom consists of an intermittent spasmodic contraction of the diaphragm.

Causes:

1. Irritation in the stomach and the bowel, due to the presence of indigestible food; hot condiments; overfilling or hurried filling of the stomach — especially noted in infants.

2. Nervous manifestations. This type is capable of suppression under disciplinary measures.

3. Obstruction in the intestine, and inflammation in the abdominal cavity.

4. Inflammatory conditions involving the diaphragm.

Treatment:

1. Pressure over the voice box (Adam's apple), with slight movement.

2. A deep breath held as long as possible.

3. Excitation of a good sneeze by tickling the nostril.

4. If the stomach or the bowels are possibly at fault, a little soda in water, a stomach wash, or an enema.

5. A little solid food by mouth.

6. Drugs on a physician's order.

7. An abdominal binder — mechanical pressure.

It should be remembered that occasionally hiccup is a symptom occurring in very severe conditions, but that as a condition in itself, it is not as a rule of any great consequence.

DUST DISEASES

In various occupations, dust is a factor menacing to the health of the worker. The brunt of the evil is borne by the respiratory tract, in which disease processes result sooner or later. Those occupations which give rise to the so-called dust diseases are ax-grinding, stonecutting, millstone manufacture, cement production, coal-mining, work in brass, iron, and bronze, as well as indoor work in flax, cotton, and grain. The irritation of the dust particles inhaled produces a bronchitis, and ultimate ulceration, abscesses, and cavity formation in the lung tissue.

Usually there are no symptoms until a number of months have been passed in a dusty atmosphere. Then the cough, which may have been limited to an occasional attack of bronchitis, becomes more or less chronic, and the patient notices a gradual loss of vim and energy. He tires easily, and is less inclined to exert

himself than before. Then he becomes wheezy, and observes that he puffs a great deal when he climbs stairs or goes uphill. He brings up a large amount of greenish-yellow material when he coughs; if he is a coal miner, it will be dark in color. If he continues at the same work, he grows slowly but progressively worse; and if he has not already developed a tubercular infection, he probably will do so eventually. Those who work in metallic and stone dusts develop tuberculosis early. Coal dust, however, seems to offer a degree of protection against a tubercular invasion.

Treatment: A change of occupation is the first thing to consider. In properly ventilated shops and factories, the dust hazard is greatly reduced. The treatment for all dust diseases is essentially the same as for chronic bronchitis and tuberculosis. (See chapters 43, 47.)

MOUNTAIN SICKNESS

Mountain sickness is a distressing condition resulting from a decrease in the oxygen content of the air. The ability of the body to receive oxygen is dependent upon the barometric pressure. If this pressure is reduced, as it is when one goes into higher altitudes, a readjustment of certain body activities is required to cope with the resulting lowered oxygen tension. The power of readjustment is limited. Most persons are able to ascend 10,000 feet without trouble. But this level seems to be the critical point above which symptoms begin to manifest themselves. A person with weakened constitution, anemia, and ailing heart may develop symptoms at 600 to 800 feet. Those, however, who are above the average physically may reach the 14,000-foot level, and some few will be able to ascend 18,000 feet, and even more.

Mountain sickness presents two types, acute and chronic. The acute results from an abrupt change from a lower to a higher altitude, as affected by train, balloon, or airplane. The chronic type is brought on when the altitude is reached by slow degrees, as by the process of mountain-climbing.

Symptoms of Acute Mountain Sickness: Rapid pulse; short, gasping breath; dizziness; nausea; perhaps vomiting; blunted sensations—sight, hearing, and touch; buzzing in the ears; great bodily weakness, to the point of prostration; a bluish tinge of the skin. The patient may become unconscious, and death will result if the altitude is maintained.

Symptoms of Chronic Mountain Sickness: Dizzy spells coming on periodically; occasional spots before the eyes; momentary dimness of vision; blueness of gums, lips, and finger tips, although the patient may feel comfortable. Later, there is

languor and physical and mental depression; frontal headache; loss of appetite; nausea; vomiting; possibly colicky pains in the abdomen, with diarrhea; increased pulse rate. The symptoms come on gradually, and increase in severity by degrees, unless the patient becomes acclimated, which is the case in many instances. Others may go on to death unless taken to a lower altitude.

Treatment: The treatment is largely preventive. Those who wish to live in high altitudes, or who propose to make mountain trips, should give strict attention to the matter of rational living. The laws of hygiene, if obeyed, will place one among the physically fit, and then the organism will be in a position to adjust itself to varying barometric pressures.

For the afflicted one, absolute rest, ice to the heart, and heat to the extremities, is the order. Smelling salts may be put into service; and if an amyl nitrite pearl is handy, it will afford temporary relief. A lower altitude should be sought at once.

CAISSON DISEASE

Caisson disease is termed a compressed air disease, and is peculiar to those who are called to work under high atmospheric pressure, as caisson workers, divers, and miners. The abnormal pressure drives a certain element of the air—nitrogen—into the tissues. It is distributed by the blood; and to be again removed, it must reënter the blood and be discharged through the lungs. If the pressure is reduced too quickly, the nitrogen will seek its release more rapidly than the blood can handle it, and will not go into solution in the blood, but will form nitrogen bubbles. These bubbles produce the serious symptoms to be described.

Symptoms: The onset, one half to one hour after leaving high pressure, is headache, dizziness, and suggestions of fainting spells. These early, rather mild symptoms may pass off, or they may usher in the more serious evidences of trouble—severe pains in the legs and the abdomen, paralysis of one or both of the legs, and sometimes of one or both of the arms as well. The patient may have the appearance of a person suffering from cerebral hemorrhage, become unconscious, and die in a few hours. If he recovers, he may be paralyzed permanently.

Treatment: Immediate recompression. The pain may be relieved by hot applications and massage.

CHAPTER 19

Hunger and Appetite

In view of the important bearing which appetite has upon the well-being of the individual, it seems that a clear outline of the relation of hunger and appetite to physical, mental, and spiritual health should be presented. The Bible gives us the idea that our first parents lost their dominion because of failure to control their desires along this line. On the other hand, Christ won a great victory by obedience to right principles in connection with appetite. Thousands are victims of uncontrolled appetites, and are suffering as the result. The plan of this chapter is more especially to consider the scientific and practical applications of the subject; but the author feels that it is a matter of tremendous significance to every person to view the subject from all angles.

HUNGER

Hunger and appetite are sensations that have to do with the lack of food. Appetite is of more than passing importance, as it bears on many phases of life. These two terms are closely asso-

ciated, and are often used interchangeably. Yet they really denote quite different sensations, so far as the mechanism of production is concerned. Hunger is chiefly due to contractions in the muscle wall of the stomach. During the digestive process, the stomach exhibits what is termed peristalsis. (See chapter 26.) This is a wavelike contraction that begins in the lower part of the stomach and travels ordinarily toward the outlet of the stomach, which is known as the pylorus. As digestion proceeds, these waves of contraction start higher and higher on the stomach wall, until the contents of the or-



Peristaltic Action of the Stomach as Revealed by the X Ray

gan are entirely expelled. When the stomach is empty, similar contractions occur at intervals, being then called hunger contractions, and produce "hunger pains." These movements of the stomach are intermittent in character; that is, they are present for a time, and then disappear, to return at a later period. The sensation produced is described by some authors as a pain sensation; hence the origin of the term "hunger pains."¹ When hunger first appears, it may be simply the sensation of emptiness; but in time, it comes to be of a more painful character. Hunger may be stopped temporarily by the eating of indigestible material; but of course it is best allayed by the taking of nourishing food. Hunger is a more pronounced sensation than appetite.

APPETITE

The term "appetite" is commonly used by the average person to designate the desire for food. Appetite is really a combination, consisting chiefly of the sensations of taste and smell. Its causation is not fully understood, and a complete explanation is more difficult to give than in the case of hunger. Lack of food develops both hunger and appetite. Partaking of food allays both of these sensations. On a prolonged fast, the appetite is considerably diminished, but the sense of hunger remains. The passage of food through the esophagus satisfies the appetite, but hunger may still exist. Emptying the stomach revives the appetite, but hunger does not always immediately appear. Appetite is thus mainly a sensory problem based upon taste and smell; and when these are satisfied, the sensation disappears. This last point is of great practical value in several ways:

1. If highly seasoned or sweet foods are eaten at the beginning of a meal, the appetite may be fully satisfied before sufficient food has been eaten to supply the nutritive needs. This is often seen with children who partake of desserts or candy before the rest of the meal.

2. By constantly using highly seasoned food, a person may lose his appreciation of the more wholesome articles of diet, and thus not be satisfied with the more nutritious foods.

3. One may eat plenty of good, ordinary food, and after having a sufficient supply of nutritive material, so far as the body needs are concerned, be tempted by fine-tasting dishes, which stimulate the appetite, and thus be led to overeat. This is a very common practice.

¹ These "hunger pains" should not be confused with the "hunger pains" that persons frequently complain of who are suffering of ulcer of the stomach. The former are scarcely recognized as pain at all, while the latter are very distressing, and are a characteristic symptom of disease.

4. The use of strong-tasting foods may call for stimulants to satisfy the cravings of the appetite. There is thus undoubtedly a definite relationship between the use of highly seasoned foods and condiments and the use of alcoholic beverages, one calling for the other.

5. Excessive use of sweets has an influence not fully realized by people generally. Children illustrate this point very nicely. Those who indulge in candy often, do not relish their other food unless it is sweetened excessively. This may go on to the point where the child does not care for necessary foods. He thus de-



The Quick Lunch — Where the Hygiene of Eating Is Forgotten

velops a "peculiar appetite," as people sometimes say, and his parents are not able to understand his dislike for common articles of diet.

APPETITE AS A GUIDE

Sherman says that appetite is not always a perfect standard for the intake of food. However, when properly trained, the appetite is a guide of great value. It seems fair to take the customs and traditions, as Sherman puts it, together with the results of research work in nutrition, as the basis of food intake, rather than to trust fully to the appetite, especially since the latter is so likely to be ill trained. McCollum, who has also done a great deal of valuable work in the study of nutritional problems, says, "The appetite is by no means so safe a guide for the proper selection of foods as has generally been supposed." On the other

hand, it means a great deal to have foods in such a form and prepared in such a way that they will be tasty and appetizing; for we have good reason to believe that food which is really relished will be better digested than food which is not pleasing to eye or taste.

Another point worthy of mention is seen in connection with hasty eating. A person may overeat because his appetite does not quickly enough control the situation. One who eats hurriedly needs to be governed by knowledge as to the amount of food necessary to maintain his nutrition; otherwise he will not only tax his digestive organs by poorly masticated food, but he will also overeat. The nervous condition has much to do with the appetite. If a man is pressed by business or other cares, he cannot govern his eating as he should. The appetite becomes untrustworthy as a guide to the quantity of food necessary.

APPETITE AND DISEASE

With the sick, appetite is a factor to be cherished. This is especially true where the nutrition is greatly reduced and the patient loses his desire for food. Fruits and green vegetables should be carefully considered in dealing with these cases, as well as in the feeding of normal people, as they are whetters of the appetite, and thus, when properly used, may help the individual devoid of appetite to develop one. It has been quite clearly shown by nutritional experimentation that too low a vitamine content in the diet (see chapter 23) may cause a lessened desire for food. The surroundings have a great deal to do with a good appetite, cleanliness and orderly appearance having a profound influence. The best appetite can be dissipated by unfavorable conditions. In sickness, the preparing and serving of food in an attractive manner is an art that gives most satisfactory results in bringing back the appetite. It goes without saying that judgment is necessary in this matter, as unsuitable food must not be given, even though it be appetizing.

FAILURE TO CONTROL APPETITE

It has been said: "Indulgence of the appetite is the greatest cause of physical and mental debility, and lies largely at the foundation of feebleness and premature death." "Failure in childhood to deny appetite and restrict desires makes one selfish, exacting, disobedient, unthankful, unholy." "Eating merely to please the appetite is a transgression of nature's law." "The declension of virtue and the degeneracy of the race are chiefly attributable to the indulgence of perverted appetite." "If the appetite is allowed to rule, the mind will be brought under its control." "Tea and coffee create appetite for tobacco, which in turn calls for liquor."

TABULATION OF COMMON FOODS
Showing Cost per Pound, Calorific Yield per Pound, and
Cost per 1,000 Calories

FOODS	Cost in Cents per Pound	Total Calories per Pound	Cost in Cents per 1,000 Calories
Almonds	30	1,660	18
Apples	5	293	17
Bananas	10	300	33
Beans, dried	6	1,600	4
Beefsteak, round	20	730	27
Beets	5	186	27
Blackberries	10	270	37
Brazil Nuts	30	1,655	18
Bread	7	1,142	6
Butter	55	3,610	15
Cabbage	4	145	28
Canned Fruit	25	1,350	18
Carrots	5	211	24
Cauliflower	5	140	36
Corn, canned	20	455	44
Corn Flakes	20	1,650	12
Corn Meal	4	1,655	3
Cornstarch	15	1,670	9
Cottage Cheese	15	509	30
Cracked Wheat	6	1,685	4
Cream	40	910	44
Cucumbers	5	80	64
Dates	25	1,611	15
Eggs	18	691	26
Egg Yolks	60	1,698	35
Fat Beef	15	1,259	12
Figs, dried	15	1,470	10
Fish, trout	20	765	26
Flour, wheat	5	1,675	3
Hominy	5	1,650	3
Honey	15	1,515	10
Lemons	5	205	25
Lentils, dried	13	1,618	8
Lettuce	5	90	55
Macaroni	10	1,665	6
Milk	6	323	18
Milk, canned	10	780	13
Oatmeal	6	1,856	3
Olives, ripe	15	1,168	13
Olive Oil	90	4,224	21
Onions	5	225	22
Oranges	5	240	21
Peanuts	15	2,562	6
Peas, dried	15	1,648	9
Potatoes	2	387	5
Potatoes, sweet	5	571	9
Prunes, dried	12	1,398	8
Radishes	5	135	37
Raisins	25	1,600	16
Rice	8	1,640	5
Sugar	7	1,856	4
Walnuts, English	30	1,375	22

Food Elements and Values

“Food is any substance that, being taken into the body of animal or plant, serves, through organic action, to build up normal structure or supply waste of tissue.”

Food elements for animals may be classed in the following manner:

1. Protein, or albuminous — nitrogenous, as meat, eggs, legumes
2. Fat — butter, vegetable oils, etc.
3. Carbohydrate — sugar and starch
4. Inorganic salts — common salt, lime, iron, etc.
5. Vitamines
6. Water
7. Oxygen

Foods can also be classified according to their function in the body, as follows:

1. Tissue-building — proteins, fats, inorganic salts
2. Energy-yielding — proteins, fats, carbohydrates, oxygen
3. Stimulants to growth and nutrition — vitamines
4. Solvent — water

PROTEINS

Protein bodies as a group are one of the most valuable classes of substances in the living organism. In fact, the word “protein” means “of first importance.” These compounds differ from the other food principles in that they contain the element nitrogen, which is an essential in the building of the working tissues of the body. Proteins are very complicated substances. They are made up of a number of simpler constituents. These simpler substances are called amino acids, and are really the “building stones” from which the body structures are formed. In a complete protein, one that is able to nourish the tissues fully, there are some eighteen of these amino acids.

Illustrations of common foods that have complete proteins in their structure are milk, eggs, meat, and nuts. Some food products do not have complete protein present. These must be supplemented with other food materials to make them capable of properly nourishing the body. Such foods are illustrated by corn and animal gelatin. The character of protein means much to the body. If food that contains incomplete protein is constantly eaten, the tissues will eventually suffer serious damage. Such a condition is like that of a house built with too few timbers in the framework. The actual amount of protein needed each

day is not large, about two ounces of the pure material, or ten per cent of the total calories of food eaten, being sufficient to maintain the wear and tear and development of the working tissues. Work does not increase the wear and tear of body structures to any marked extent, but such activity does cause an increased use of energy-yielding foods.

The digestion of protein is carried on in the stomach and the small intestines, and it consists of a process that breaks the large, complicated protein into the individual amino acids. These less complicated substances are then carried to the tissues by the blood, and the individual cells select from this supply the materials needed for replacing and building their structure. Protein material can also be used as a source of energy, and when acting in this way, yields 4.1 calories to the gram, or 116 calories to the ounce, of pure protein; but this function is of less importance than their tissue-building power. The following table gives examples of some of the more important foods that are of special value in supplying protein to the human body:

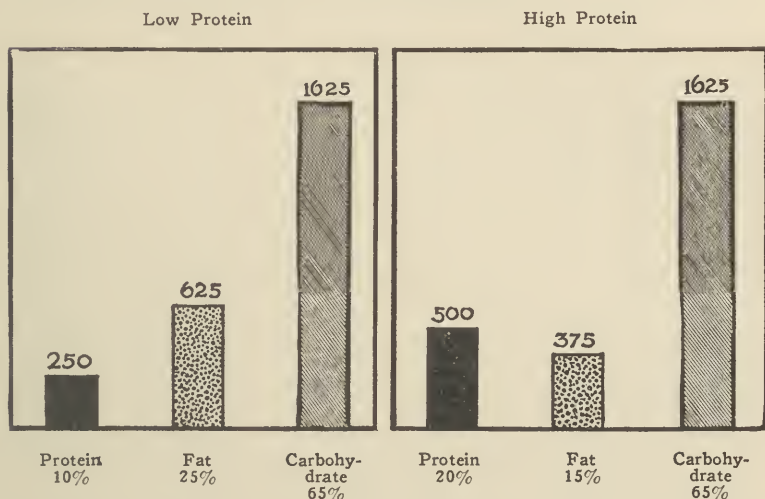
FOOD	Percentage Composition					Calories per Ounce				Calories per Pound
	Water	Pro-tein	Fat	Carbo-hydrate	Ash	Pro-tein	Fat	Carbo-hydrate	Total	
Beans, dried	12.6	22.5	1.8	59.6	3.50	26.1	4.8	69.1	100.0	1,600
Beefsteak, round	70.0	21.3	7.9		1.1	24.7	20.9		45.6	730
Cottage Cheese	72.0	20.9	1.0	4.3	1.8	24.2	2.6	5.0	31.8	509
Eggs	73.7	13.4	10.5		1.0	15.5	27.7		43.2	691
Fish, trout	70.8	17.8	10.3		1.2	20.6	27.2		47.8	765
Lentils, dried . . .	8.4	25.7	1.0	59.2	5.7	29.8	2.6	68.7	101.1	1,618
Milk	87.0	3.3	4.0	5.0	.7	3.8	10.6	5.8	20.2	323
Peanuts	9.2	25.8	38.6	24.4	2.0	29.9	101.9	28.3	160.1	2,562
Peas, dried	9.5	24.6	1.0	62.0	2.9	28.5	2.6	71.9	103.0	1,648
Walnuts, English	2.5	16.6	63.4	16.1	1.4	19.3	167.4	18.7	205.4	3,286

FATS

Fats are represented by such substances as butter, cottonseed oil, and tallow. They contain the chemical elements carbon, hydrogen, and oxygen, and are especially valuable on account of their ability to yield energy to the body. Fats are made up of two constituents, fatty acids and glycerin. During the process of digestion, these constituents are separated from each other; but later they are again united to form emulsified fat, that is, fat that is broken up into very small droplets, as in milk and cream. In this form, the fats are carried into the circulation and are made available for the tissue needs.

There are two classes of fats used for foods in nature, the solid animal fats and the more liquid vegetable oils. Recent experimentation has developed a chemical method by which the vegetable oils can be converted into solid, lardlike fats; and these solid fats are less likely to decompose than the original oils, and are as valuable to the body as sources of energy as the other common fatty substances. Certain kinds of fats have been found to contain active substances (vitamines) that stimulate the

GRAPHIC ILLUSTRATION OF A BALANCED RATION ON THE BASIS OF 2,500 CALORIES



growth and nutrition of the body, butter fat being the most common example. The vegetable oils have not thus far been shown to contain these active principles, and therefore cannot fully replace milk, cream, and butter in this respect. In addition to this function of certain fats in supplying stimulants to nutrition, fats as a group yield energy, and when stored in the body, give protection and a reserve of energy-producing substance. The fats as a group yield 9.3 calories to the gram, or 264 calories to the ounce. The reserve fats of the human body are not only derived from the fat eaten as food, but can also be formed from the carbohydrates and proteins taken as food.

The following table gives a few of the more common foods that supply liberal amounts of fat to the body:

FOODS	PERCENTAGE COMPOSITION					CALORIES PER OUNCE				Calories per Pound
	Water	Pro- tein	Fat	Carbo- hydrate	Ash	Pro- tein	Fat	Carbo- hydrate	Total	
Almonds	4.8	21.0	54.9	17.4	2.0	24.4	144.9	20.2	189.5	3,032
Brazil Nuts ...	5.3	17.0	66.8	7.0	3.9	19.7	176.4	8.1	204.2	3,267
Butter	11.0	1.0	85.0		3.0	1.2	224.4		225.6	3,610
Cream	74.0	2.5	18.5	4.5	.5	2.9	48.8	5.2	56.9	910
Egg Yolks	49.5	15.7	33.3		1.1	18.2	87.9		106.1	1,698
Fat Beef	59.7	17.8	22.0		.9	20.6	58.1		78.7	1,259
Olive Oil			100.0				264.0		264.0	4,224
Ripe Olives	64.7	1.7	25.0	4.3	3.4	2.0	66.0	5.0	73.0	1,168

CARBOHYDRATES

The carbohydrates are represented by the sugars, starches, and woody fiber of plants. They have the chemical elements carbon, hydrogen, and oxygen, the same as the fats, but the proportion of oxygen is greater. These foods yield energy to the body, and, in fact, are the most important foods of this class. The sugars are white, crystalline solids, sweet in taste, and are found in nature in fruits, honey, certain vegetables, and sugar cane. The commonest sugars are cane sugar, malt sugar, milk sugar, glucose, and levulose.

The starches are found in grains, tubers, fruits, and nuts. They are white and granular in form. They are tasteless, because they are not soluble; but they are the most important sources of carbohydrate food supply. Starch is more readily digested after being cooked, as the cooking process renders it soluble. Cooking and baking change starch to dextrin.

Cellulose occurs in the framework of the plant, and also to some extent in the seed, the tuber, or the fruit. Cellulose is not readily digested by the human system; but it supplies bulk, and thus helps to keep up the elimination from the intestinal tract.

The digestion of carbohydrates consists in the conversion of the more complicated forms into the simple sugars, starch being converted into common glucose, or grape sugar. It is in this form that the sugar circulates in the blood. The liver and the muscles are capable of storing some of this carbohydrate in the form of muscle starch, or glycogen, in their own structure. Demand is made upon this reserve of carbohydrate when heavy work is done, and at times when one is not eating sufficient food, or is on a starvation program. The blood ordinarily contains only a minute quantity of carbohydrate material; but in diabetes, where the body is not able to make use of glucose as readily as

usual, it gradually accumulates until the kidneys eliminate it as waste product. When heavy work is done, the amount of carbohydrate should be proportionately increased in the diet. This class of food material should ordinarily make up from sixty to sixty-five per cent of the total calories eaten.

The following list of foods gives some of the more common sources of carbohydrates:

FOODS	PERCENTAGE COMPOSITION					CALORIES PER OUNCE				Calories per Pound
	Water	Protein	Fat	Carbo-hydrate	Ash	Protein	Fat	Carbo-hydrate	Total	
Apples	84.6	.4	.5	14.2	.3	.5	1.3	16.5	18.3	293
Bananas	75.3	1.3	.6	22.0	.8	1.5	1.6	25.6	28.7	459
Beets, cooked	88.6	2.3	.1	7.4	1.6	2.7	.3	8.6	11.6	186
Bread, whole wheat	38.4	9.7	.9	49.7	1.3	11.3	2.4	57.7	71.4	1,142
Carrots	88.2	1.1	.4	9.3	1.0	1.3	1.1	10.8	13.2	211
Corn Flakes .	8.5	9.3	.5	78.7	2.6	10.8	1.3	91.3	103.4	1,650
Corn Starch .				90.0				104.4	104.4	1,670
Dates	15.4	2.1	2.8	78.4	1.3	2.4	7.4	90.9	100.7	1,611
Figs	18.8	4.3	.3	74.2	2.4	5.0	.8	86.1	91.9	1,470
Honey	18.2	.4		81.2	.2	.5		94.2	94.7	1,515
Oatmeal	7.3	16.1	7.2	67.5	1.9	18.7	19.0	78.3	116.0	1,856
Potatoes	78.3	2.2	.1	18.4	1.0	2.6	.3	21.3	24.2	387
Potatoes, sweet	69.0	1.8	.7	27.4	1.1	2.1	1.8	31.8	35.7	571
Prunes	22.3	2.1		73.3	2.3	2.4		85.0	87.4	1,398
Raisins	14.6	2.6	3.3	76.1	3.4	3.0	8.7	88.3	100.0	1,600
Rice	11.9	8.0	1.9	76.0	1.15	9.3	5.0	88.2	102.5	1,640
Sugar				100.0				116.0	116.0	1,856
Wheat Flour, entire	11.4	13.8	1.8	71.9	1.50	16.0	4.8	83.4	104.2	1,667

INORGANIC SALTS

Inorganic salts are the ashes of food; that is, the material that is left after the food is burned. These salts are composed of mineral elements, and are of very great value to the body. They are simple in character, consisting of compounds of potash, soda, magnesia, lime, iron, sulphur, and phosphorus. Though small in amount, iron making up only one in 25,000 parts of body weight, yet they are of much importance in the activity of the tissues. They aid in the formation of the blood and the body juices. They supply material for building tissue, and help to control the production of acid in the body. Normally the tissues are faintly alkaline in reaction; that is, they are capable of counteracting acid. When the body is active, acid substances are produced; and these salts help to regulate the amount of acid

present, and by neutralizing it, aid in its elimination. Foods that are near to their original form are richer in these salts than are those which have been subjected to a process of preparation, such as the highly milled cereal products, in which the milling removes some of the coarser part of the grain, which is rich in these salts. The approximate daily requirement for the entire body, of some of the mineral elements, is as follows:

Iron	1/6 to 1/4 grain a day
Lime	7 to 10 grains a day
Phosphorus	15 to 22 grains a day

Below are listed some of the common foods rich in inorganic salts, and also those which are poor in the same:

Rich in Salts	Poor in Salts
Fruits	Polished Rice
Milk and Eggs	Refined Corn Meal
Vegetables	Sugars and Sirups
Whole Grains	White Flour

VITAMINES

Recent studies of food problems have demonstrated the presence, in natural foods, of minute quantities of chemical substances that have a marked influence over nutrition and growth of the body. The name "vitamine" has been given to them. A discussion of this important food element is taken up in chapter 23.

WATER

Water, although a very simple substance, is one of the most essential constituents in the nutrition of plants and animals. Animals can go without food for many days, even from thirty to forty; but without water, death will take place in from three to four days. Water is the universal solvent. In the body, it carries food and waste materials. It makes all the digestive processes possible; and it bathes the cells with the proper nutrient materials, so as to keep them in living, active form. The average person needs from three to five quarts a day, part of which is taken in the food eaten, and the remainder, from three to five pints, as a beverage. Good drinking water should be clear, colorless, odorless, and of an agreeable taste. It should be free from organic matter, poisonous minerals, and the bacteria of disease. And it should be low in nonpoisonous mineral salts; that is, it should be reasonably soft.

OXYGEN

Oxygen is the life-giving principle of the air which, when taken into the body, unites with the blood, and in this way is carried to the tissues, where it is liberated and combines with the food materials. This process of combining is called oxidation, and it yields energy to the organism. Although oxygen is not a food in the sense that some of the other products are, yet without it the other food materials would not be available as nutrients. Oxygen does the same thing for the body that air does for the stove. When the draft of a fire is closed, the fire burns feebly and may go out; so in the body, when poor air is supplied, or one breathes in a way that does not furnish sufficient oxygen, nutrition is greatly hindered. The iron of the blood makes the carrying of oxygen possible; hence when iron is deficient, the supply of oxygen is below the average, and the individual is weak and reduced in vitality. (See chapter 35.)

MEASUREMENTS OF FOOD VALUES

The best method of expressing the value of a food is the use of the calorie. The calorie is a unit of heat measurement. A large calorie, the one used in food calculations, is the amount of heat required to raise one kilogram (2.2 pounds) of water one degree centigrade (1.8° F.). The same unit is used in the measurement of the value of fuels for use in stoves or steam boilers. The method of determining the calorie yield of both foods and fuel is the burning of a weighed sample of the product in question in an apparatus that is called a bomb calorimeter. This instrument is supplied with accurate thermometers that register the heat produced in burning the sample of material whose heat-yielding value is to be determined. By its use, one ounce of pure protein yields 116 calories. If the food sample in question has only a small portion of protein, say five per cent, the calorie value of its protein content can be calculated from the percentage composition by the use of the factor 1.16, which is one per cent of the total yield of an ounce of pure material. Thus $5\% \times 1.16$ would give 5.8 calories of protein in a food having the five per cent of protein present. Fat yields 264 calories to an ounce when pure; thus the factor for fat would be 2.64. Then taking the percentage of fat in a given food and multiplying it by 2.64, the calories of fat to an ounce are determined. For carbohydrates, the same factor is used as in the case of protein, since one ounce of pure carbohydrate yields 116 calories. By taking the percentage composition of a food as a whole, and using the foregoing factors, we can determine not only the calories of protein, fat, and carbohydrate, but the total yield of calories to

the ounce for the food. The following is an example of how the method of computation is applied to milk:

	Protein	Fat	Carbohydrate	Total
Percentage Composition	3.3	4.0	5.0	
Factor	1.16	2.64	1.16	
Calories to an Ounce	3.8	10.6	5.8	20.2
Calories to a Quart, calculating 32 ounces to a quart	121.6	339.2	185.6	646.4

By the application of this method to the percentage composition of any food, similar results can be obtained, which are very useful in determining the value of food as an energy-yielding substance.

It is impossible to judge fully of the value of a food by a consideration of the calories alone. As previously stated, there are constituents whose presence is not indicated by the chemical composition which are of very great value; for example, vitamines and inorganic salts. In order that the complete value of a food may be judged, it must be submitted to the biological test—that is, feeding experiments—in addition to chemical examinations.

ECONOMIC VALUE OF FOODS

There are four cardinal values that aid us in judging the value of food, in an economic way:

1. Energy yield
2. Protein yield
3. Inorganic salt content
4. Presence of vitamines

A food may yield valuable inorganic salts and vitamines, and yet be of little value as far as calories are concerned. Such a food may be worth more to the body than some foods that yield many calories. The food with the high cost and fancy appearance is not always of the most service. In fact, some of the cheapest and simplest foods are of the greatest value.¹

BALANCED RATIONS

A balanced ration is the proper quantity and kind of food for the day's supply. To be satisfactory, a ration must contain

¹ To illustrate the comparison of foods from the economic standpoint, the following tabulation of eggs and milk is given:

	Quantity	Weight	Cost	Calories Protein	Calories Total	Cost of 1,000 Calories
Eggs	1 egg	1½ ozs.	3 cents	23.2	64.8	46.3c
Milk	½ pint	8 ozs.	3 cents	26.4	161.6	18.6c

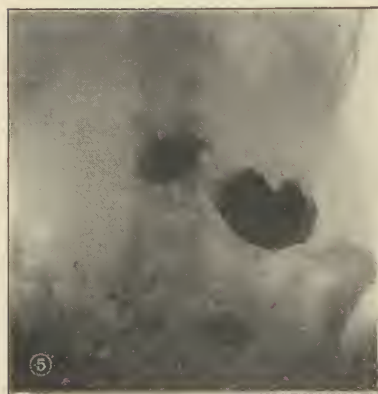
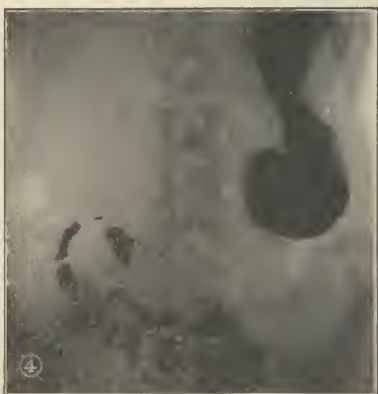
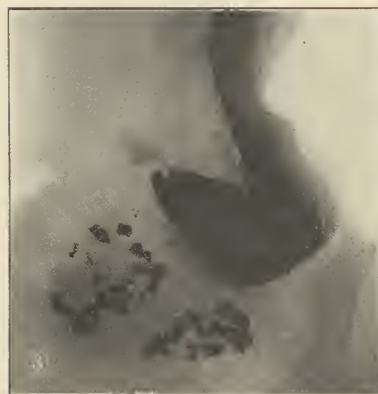
Since eggs and milk are both well supplied with inorganic salts and vitamines of good quality, we can compare them directly on the caloric basis; and in this way, the milk is at once seen to be about two and one half times cheaper than the eggs.

sufficient protein, fat, carbohydrate, vitamins, and inorganic salts. The Chittenden standard is now believed to be one of the most satisfactory. This standard allows about 10% of calories in the form of protein, 25% in the form of fat, and the remainder, or 65%, in the form of carbohydrates. The higher protein rations are not essential, as the body requires only a moderate amount of protein. Excess of protein, although able to yield energy to the body, is an expensive form in which to supply it, and requires more energy on the part of the body for its utilization. There are also some decided disadvantages to the high protein ration, all of which make the low protein standard more desirable. (See chapter 22 for total food required under various conditions.)

By referring to the tables of food values given in this chapter, one can quite readily make a selection that will give approximately the required proportions of the food elements.

Simple Menus to Illustrate the Balanced Ration

	I	II	III
BREAKFAST	{ Corn Flakes Milk Eggs Graham Bread Honey	Boiled Wheat Cream Milk Stewed Prunes Entire Wheat Bread	Oatmeal Milk Eggs Zwieback Butter
DINNER	{ Boiled Potatoes Baked Beans Lettuce Whole Wheat Bread Butter Custard Pie	Cream Tomato Soup Baked Sweet Potatoes Cream Gravy Protose Entire Corn Bread Butter	Baked Potatoes Nut Loaf Spinach Corn Pulp Graham Bread Butter
SUPPER	{ Oatmeal Crackers Apple Sauce Ripe Olives Grape Juice	Bananas Baked Apple Raisins and Nuts Fresh Toast	Graham Crackers Peaches Bran Buns Orange Juice



X RAY PICTURES SHOWING THE GRADUAL EMPTYING OF THE STOMACH

Figure 1 shows the stomach 15 minutes after eating; figure 2, 20 minutes after; figure 3, 30 minutes after; figure 4, one hour and a half after; figure 5, three hours and a half after; figure 6, five hours and a half after.

Hygiene of Eating and Drinking

In any business enterprise, system and regularity in connection with the base of supplies is fundamental. Similarly, in the care of the health, the base of food supply must be guarded in many ways, so as to furnish the elements essential to the upkeep of the body, and also to keep the nutrient materials in such a condition that they will yield the greatest amount of energy to the organism, without causing harm.

THE BODY MADE FROM FOOD

The human body is made up of materials contained in the food eaten. In order to provide materials for the best success in body construction, it is necessary to give the matter careful study and attention. In other words, one should seek to become intelligent in the selection of food. No one would think of trying to build a good house out of decayed lumber. How much less can the body be constructed or sustained by the use of food materials that are unwholesome,—foods teeming with bacteria, such as milk produced in uncleanly surroundings, or kept under unfavorable conditions while being transported to the customer.

RELATION OF FOOD TO HEALTH

Dietetics is now taking its place as a scientific subject. Thousands of physicians appreciate its value as a healing and preventive measure; and the laity are coming more and more to understand the need of a proper food supply, and the necessity of forming right habits of eating and drinking. When such men as Dr. William Osler state that “ninety per cent of all conditions outside of acute infections, contagious diseases, and injuries are directly traceable to diet,” it is high time for everyone to study earnestly to find his particular needs in this line. The problem of food supply can be compared to that of furnishing fuel for a fire. The food is in reality the fuel for the body fire. By the use of suitable foods, the body fires can be kept clean and bright, and a maximum amount of energy can thus be produced. Over-supply, or a supply of material unsuited for the purpose, clogs the body activities and lowers the resistance; and as a result, the organism is unable to rid itself of the poisons that accumulate. Long continued abuses of this sort are doubtless the foremost cause of such chronic diseases as hardening of the arteries,

kidney disorders, apoplexy, and others of the so-called degenerative type. (See chapter 5.)

A person whose food supply is poorly controlled is also more subject to the acute infectious diseases that are still prevalent, although to some extent lessened in severity and mortality. Furthermore, carelessness in eating and drinking is one of the commonest early indications of a downward course in religious experience. Wise eating goes hand in hand with true education. The latter is defined as the harmonious development of the mental, physical, and spiritual powers. Eating improperly, and neglecting the simple things that are essential to the building up of the body, lead to neglect of other phases of life, and are a detriment in many respects.

PHYSICIANS SEE THE VALUE OF DIET

Physicians are seeing more and more the importance of sane habits of eating and drinking. Many of the ablest of them make diet one of the prime factors in the treatment of their cases. Recent investigations carried out by some of the best research men are giving us a scientific basis for eating that we have not had before. Many of the most valued points have been determined by definite experiments in feeding animals and men. The conclusions reached in this way are of practical worth, and cannot fail to make an impression upon thinking people.

PREPARATION AND CARE OF FOOD

The preparation of food, and its care both before and after preparation, is one of the most important branches of hygiene. As is clearly understood, a number of serious diseases are frequently transmitted through food and drink. Typhoid fever is a good example of such diseases. It is often transmitted through contaminated water, and also by common foods, such as milk. Such problems will not be discussed in detail in this chapter, as they are carefully considered elsewhere in this volume.

Cooking is a part of food preparation that is often poorly done, and many thousands of people suffer damage to health in consequence. Cooking is really a science of the greatest moment the world over. It is receiving more attention than formerly, but there is room for much improvement in the methods used by the ordinary housewife.¹ The effect of germs upon the food is of utmost interest, not only from the standpoint of the transmission of disease, but also because these organisms frequently produce deterioration in the food products, making

¹An excellent cookbook is "Science of Food and Cookery," H. S. Anderson, Pacific Press Publishing Association.

them less nutritious, and at times even rendering them poisonous. Ptomaine poisoning is an illustration of this; and although we hear less of it than formerly, it is far too prevalent. Botulism is an illustration of food poisoning resulting from the growth of bacteria in food. (See chapter 17.)

PURPOSE OF EATING

Our purpose in eating should be to provide the body with the material that will give it maximum power to do work. We should "eat to live and not live to eat." Many people live to eat; and because of this, their health is seriously injured. Many more people, it is estimated, die from overeating than from eating too little. This is particularly true of our American people. Some one has said, "We Americans dig our graves with our teeth." It seems highly needful that we realize this, and so modify our habits of eating as to overcome some of these faults that are so prevalent.

SIMPLICITY IN EATING

Those who comprehend the importance of the subject know full well that the simple life is the one that gives results in the development of health. A few varieties of food, intelligently selected, at each meal, guard against overeating, and are amply sufficient for the whole system. There should be change from day to day in the kinds of food eaten, as too narrow a list of foods is likely to cause deficiency. Variation from time to time helps in the maintenance of the appetite, and also gives more enjoyment in eating.

COMBINATION OF FOODS

The right combination of foods is a principle of great importance, both in sickness and also as a preventive measure. One of the most essential points in the combination of food is to supply a ration well balanced in acid and base-forming elements. Acid-forming foods are those which yield, upon burning, an ash in which acid material predominates. These foods are represented by meats, eggs, and cereals. On the other hand, base-forming foods are those which yield an alkaline ash. The base-forming foods are thus opposite to the acid-forming, one being able to neutralize the other when they are properly combined. The base-forming foods are represented by vegetables, fruits, and the legumes. There are also certain food substances that are neutral, because they do not have an excess either of acid or of alkali. They are represented by starch, sugar, fats, and oils. The important point in the consideration of this problem

of food combination is to have the alkaline, or base-forming type of foods equal to or predominating over the acid-forming. It should also be our effort to select such foods as will prevent excessive bacterial decomposition or fermentation in the digestive tract, as far as possible. (See "Meat a Putrefactive Food," chapter 25.) A simple list of foods, with a moderate amount of liquid food, and avoidance of an excess of water-drinking at the time of eating, will be helpful in this line. We should aim so to combine foods that the opportunity for excessive fermentation will be cut to the minimum, and the digestive process favored to its maximum, and also so that one food will not interfere with another in the digestive process. The following combinations of food are favorable for good digestive work:

1. Cereals with any other class of foods.
2. Nuts with any other class of foods.
3. Eggs with any other class of foods.
4. Fruits with cereals and nuts.
5. Milk with cereals and with the less acid fruits.
6. Vegetables with cereals and nuts.

The following are unfavorable combinations for the best digestive work:

1. Large quantities of milk and sugar.
2. Fruits with coarse vegetables.
3. Milk with strong acids.
4. Cooked fruits with sugar and milk.
5. Strong acids with starch.
6. Too many kinds of food at one meal.
7. Complicated mixtures of any kind.

It should also be our endeavor so to combine the foods eaten that they will together yield approximately 10% of the calories in the form of protein, 25% in the form of fat, and 65% in the form of carbohydrate. (See explanation, chapter 20.) This is the Chittenden balanced ration, and represents the low protein standard.

STIMULATING BEVERAGES

Undoubtedly one of the most injurious practices in connection with eating and drinking is the taking of stimulants with the food. The most objectionable products of this type are alcoholic liquors and the caffeine beverages. Alcohol was formerly regarded as a food by some people, since a portion of it can really be utilized in the body; but the following characteristics certainly forbid its being classified as a food product:

1. Its local irritant action.
2. Its destructive action upon tissue.
3. Its narcotic action on the central nervous system.
4. Its tendency to form a vicious habit.

These actions place it in the list of poisons, and not in the list of foods. Alcohol has been found to lower the intellectual powers, weaken the memory, and decrease one's ability to do ordinary work. It really affects the nervous system in the same way that the anæsthetics, ether and chloroform, do; for it lessens muscular power, depresses the heart and the circulation, and restricts the body's power to fight disease. Life insurance companies have found that even moderate use of liquor shortens life. The average risk of moderate drinkers is placed eighty-six per cent above that of nondrinkers of the same age and condition. Alcohol is a deceiver. It makes a man feel rich when he is poor, strong when he is weak, and warm when he is cold.

The caffeine beverages are represented by tea and coffee. One cup of coffee as commonly made contains from one and one half to three grains of caffeine, an active, damaging stimulant. One cup of tea has about one to two grains of the same powerful drug present. A medicinal dose of caffeine ranges from one to five grains. By drinking two or three cups of tea or coffee, one would receive more than a full medicinal dose. In large doses, this drug is a marked poison. Its use tends to produce a habit that is frequently difficult to overcome. Tea, in addition to its content of caffeine, has another harmful constituent, tannic acid, which has a pronounced astringent effect upon the digestive organs. This action is detrimental to digestion, as it retards the circulation in the area it touches.

CONDIMENTS

Condiments such as mustard, pepper, ginger, horse-radish, cloves, and spices are valueless as foods. They have been supposed to be of value as stimulants to the appetite and the digestion. The stimulating effect which these substances produce is due to the presence of an irritating principle that acts by definitely attacking the mucous membrane of the digestive tract. The effect upon appetite is one of perversion, so that the person who uses them in excess gradually loses his desire for ordinary wholesome food. The strong taste which these substances impart to the food has a tendency to cause overeating. The stimulating action is not a constant result from their ingestion; for in many cases, they depress. They are more or less poisonous, and therefore require extra work on the part of the eliminative organs, such as the liver and the kidneys. Healthy people do not need them, and sick people are more susceptible to their damaging effects. They have no field of usefulness in the diet of either sick or well, and therefore should be eliminated from the table of the one who desires to safeguard the health.

THE USE OF LIQUIDS AT MEALS

The practice of drinking large quantities of water, lemonade, fruit juices, or other beverages at the meal is detrimental to the digestion of food. A small quantity of liquid may be taken at the meal without harm, provided it is not taken for the purpose of washing down the food. Large quantities lessen the activities of the saliva and the gastric juice, and as a rule interfere with proper mastication. The most satisfactory time for drinking large quantities of water is early in the morning or between meals.

TIME OF EATING

There should be at least a five-hour interval between meals. This gives time for the stomach to clear itself of the previous meal before other food is taken. Some people would be benefited by taking only two meals a day; if three meals are eaten, the evening meal should be the lightest. This is contrary to the ordinary practice of people in the business world, but is certainly a point worthy of attention. The third, or evening meal should consist of simple articles of food, such as fruit. In this connection, it is also important to consider the time spent in eating a meal. The rush and press of business prevents the average individual from spending sufficient time to get the best results from the food eaten. If thirty minutes, instead of ten or fifteen, could be taken for a meal, better results would be seen in the utilization of food, and there would be less digestive trouble.

INFLUENCE OF MIND UPON DIGESTION

Laboratory and practical experience has shown that when a person partakes of food while under stress and strain of work and worry, the digestive process is hindered; hence it is unwise to carry business and other troubles to the dinner table. It is also unfavorable to the best digestive work to read and study while eating. The most favorable conditions for eating are cheerfulness and freedom from care. The manner in which the food is served has a decided influence upon the way the body handles the material. When the food is put up in a neat and appetizing form, it appeals to the appetite more keenly; and when thus stimulated, the digestive work is at its best. On the other hand, we must remember that the digestion reacts upon the mind to a considerable extent. It has been said that "clean living goes with clear thinking;" and there is no question but that a good physical condition favors good work in mental and spiritual lines. Good health also enables one to exert a more telling influence upon the lives of others.

Facts on Diet for All Classes

The subject of diet is of great importance to health, and dietetic regulation is coming to be utilized more fully as a preventive measure and in the treatment of disease. Modern research has given dietetics a thoroughgoing basis, and has brought forward proof of its value in the maintenance of health as well as in the treatment of the sick. The food supply on the market consists of a very wide variety, thanks to achievements in agricultural lines, the marvelous system of transportation connecting the different parts of the world, and the manufacturing establishments devoted to the production of foods. In many ways, this increase in variety of foods has been helpful; but on the other hand, many of the manufactured foods are so changed by the process of manufacture, that they are not capable of nourishing the body as the original product would. This is particularly true of a large number of cereal products and canned goods. These foods are still nutritious, but they are lacking in some of the nutrient principles, such as vitamins and inorganic salts.

In this connection, it is of interest to notice the diversity of elements that enter into the make-up of the human body. The following table gives the amounts of each element, and also comparative figures for these elements as they exist in the earth:

**Composition of the Human Body as Compared with That of the Earth,
Including Water and Atmosphere**

Constituent	Human Body	Earth
1. Oxygen	66.0	49.85
2. Carbon	17.5	.19
3. Hydrogen	10.2	.97
4. Nitrogen	2.4	Trace
5. Calcium	1.6	3.18
6. Phosphorus .....	.9	Trace
7. Potassium .....	.4	2.33
8. Sodium .....	.3	2.33
9. Chlorine .....	.3	.20
10. Sulphur .....	.2	Trace
11. Magnesium .....	.05	2.11
12. Iron .....	.005	4.12
13. Iodine	Trace	Trace
14. Fluorine	Trace	Trace
15. Other Elements	Traces	1.00 ¹
16. Silicon .....	....	26.03
17. Aluminum .....	....	7.28
18. Titanium .....	....	.41

¹ This one per cent includes about seventy elements.

It will be seen, from this table, that the composition of the body is quite similar to that of the earth in the character of the constituents it contains. This table also gives some idea of the food constituents needed to keep the body fully supplied, as each of these elements must be replenished from the food eaten. Foods that are deficient in some important constituent, if used persistently, at the expense of other products necessary to build body tissue, will in the long run be damaging factors.

THE IDEAL DIET

Those who are doing experimental work in dietetics in the research laboratories of the country recognize the lacto-vegetarian *régime* — that is, a diet consisting of fruits, grains, nuts, and vegetables, plus milk — as ideal for human beings. Such a dietary gives all the necessary elements listed in the foregoing table, in a form in which they are easily used by the digestive system.

It is impossible to make a definite list of foods answer for all persons, since there are certain individual variations in the utilization of food. There is, however, in this list, sufficient variety to supply all the needs of the human race. Meat, although yielding protein in an easily available form, is an unfavorable food, in that it contains an excess of protein, and also favors intestinal putrefaction. Nutrition can be amply maintained on a purely vegetable dietary, but greater care in the selection of foods is necessary than when milk is included.

AMOUNT OF FOOD NEEDED EACH DAY

Experimental studies have shown that an adult needs from fifteen to eighteen calories to each pound of body weight for a day of twenty-four hours when on a resting program. When one is doing moderate work, this should be increased to eighteen to twenty calories; and on a hard work program, to twenty or thirty calories a pound. This amount of food should be taken in the form of a balanced ration; that is, a ration containing the quantity and kind of food required to meet the various needs of the body. (See chapter 20.)

The Chittenden ration is the one most useful. It supplies 10% of the total calories taken for the day, in the form of protein or nitrogenous foods, about 25% in the form of fat, and 65% in the form of carbohydrates, such as starch, dextrin, and sugar. This ration also includes a proper supply of inorganic salts and vitamins.

Dr. Lusk gives comparative dietaries of some of the interesting peoples of the world as follows:

NATION	Body Weight in Pounds	Protein in Grams	Total Calories	Per Cent Protein Calories	Per Cent Fat Calories	Per Cent Carbohydrate Calories
Eskimo	143	282	2,604	44	48	8
Bengali	110	52	2,390	9	10	81
European	154	118	3,050	16	17	67

BASIS FOR JUDGING FOOD

We cannot estimate the value of a food by chemical analysis alone. The modern basis for judging a food takes into account its action as a nutrient in connection with definite feeding experiments as well as the results of chemical tests. Exactly how a food will act in the body cannot be determined by considering its composition only. The biologic method of study mentioned above has given us a much more satisfactory basis for dietetics than has ever been formulated before.

DIETETICS FOR CHILDREN¹

This discussion is not intended to outline a plan for the feeding of the sick, but of normal healthy subjects so as to give the best results in growth and nutrition as well as in mental development. In the feeding of children, the old maxim, "An ounce of prevention is worth a pound of cure," is surely an excellent one. Children need food that will build tissue, repair waste, and supply fuel to meet the output of energy. The foods especially desirable for children are milk, entire wheat bread, unpolished rice, oatmeal, cracked wheat, hominy, vegetables — potatoes, carrots, peas, beans, and green leaves, such as lettuce, spinach, and cabbage — and fruits. The following foods are to be avoided as regular articles of diet: white bread, polished rice, pastries, sirups, candies, pancakes, excess of sugar, and too much liquid food. The excessive use of cane sugar, in food or in the form of candy, is a practice that deserves unqualified condemnation. Sugar of this type is an unbalanced food, being carbohydrate only. In addition to being unbalanced, it makes the maintenance of balance on the part of other foods more difficult, as in being handled in the body, the sugar calls for other elements to unite with it to prevent harmful action to the tissues. This is particularly true of lime. This extra call for lime depletes the supply of this very important constituent; and as a result, certain tissues are damaged. This explains why the teeth are injured by the excessive use of candy, for these organs require a liberal amount

¹ References for helps in regard to the nutritional problems of children: Elizabeth McCormick Memorial Fund, 848 North Dearborn Street, Chicago, Ill. Nutrition Clinics for Delicate Children, 44 Dwight Street, Boston, Mass. From both of these sources, at very small expense, papers can be obtained, that give most excellent information as to how to care for the children in our midst so as to get the best results in development.

of lime to keep them in good order. Brown sugar and the dark sirups are less harmful than the pure white product, since they contain fair amounts of both lime and iron; but even these should be used with moderation. It is far better to satisfy the desire for sweets by the use of fruits, such as figs, dates, raisins, and prunes. It should also be borne in mind that children need the protective foods, such as milk and green leaves of vegetables, quite as much as adults. The amount of food needed daily by the average child is well outlined in the following table given by Sherman:

Age	Calories Daily
1 to 2 years	900 to 1,200 calories
2 to 5 years	1,200 to 1,500 calories
6 to 9 years	1,400 to 2,000 calories
10 to 13 years	1,800 to 2,200 calories
14 to 17 years (girls)	2,200 to 2,600 calories
14 to 17 years (boys)	2,500 to 3,000 calories

By a glance at the foregoing table, it will be seen that a child of two years needs about three tenths of the adult ration; one ranging from three to five years, about four tenths of the adult ration. From six to nine years, the ration should be about one half that of the adult; and from ten to thirteen, six tenths of the amount the adult would require. Boys of fourteen and beyond need, as a rule, the full amount taken by an adult, whereas girls of the same age require about seven or eight tenths of the amount taken by older persons. The following height-weight chart will help those who deal with children to know whether they are making normal development or not:

AGE Years	Boys		GIRLS	
	Height Inches	Weight Pounds	Height Inches	Weight Pounds
One	29½	18½	27½	18
Two	32½	32½	31	25¼
Three	35	34	34	31½
Four	37	37	36	36
Five	40	40	39	39
Six	43	44½	42	41¾
Seven	46	49¾	44	47½
Eight	47	55	46½	52
Nine	49¾	60½	48¾	53½
Ten	51¾	67½	51	62
Eleven	53½	72	53	68
Twelve	55	76¾	55½	76½
Thirteen	57	82½	57¾	87

EATING HABITS OF CHILDREN

There are several matters that are of special importance in connection with the dietetic habits of children. They should be taught to chew their food sufficiently. The act of chewing develops the nose and the throat, making the child less liable to have adenoids. Chewing also tends to keep the teeth healthy. Eating between meals is very harmful, and it should be strictly avoided, for it is frequently the foundation of trouble in later life. Greediness should be controlled in children, for it leads to overeating and to indulgence in wrong kinds of food, and spoils the fine sense of discernment on the part of the appetite. The appetite is of great value when properly trained. Eating heavy suppers is also a practice that will bring bad results in health lines. Breakfast and dinner should be the larger meals.

The following suggestions will help greatly in the feeding of children:

1. Plain, simple food.
2. Regularity in time of eating, with no food between meals.
3. Thorough chewing.
4. Limited variety of food, well chosen, so as to include all nutrients.
5. Youth is the time to cultivate respect for all wholesome foods.
6. Happiness and peace are the best sauce. Food taken in grief or anger has little chance to fulfill its mission.
7. Sweets should not be given between meals, as they lessen the appetite for ordinary foods, and make the taste of good food less pleasing.

FOOD FOR LABORERS

A human being usually has his full growth at twenty years of age. From this on to fifty or sixty, there is no additional production of tissue in the way of growth. The needs are simply those of wear and tear and repair of tissue, in addition to the supply of energy needed to carry on the activities of life. Work demands a marked increase in the amount of food eaten, as fuel for maintaining the body energy is supplied by the food. The following table illustrates the variation in the number of calories needed under different conditions of activity:

OCCUPATION	CALORIES FOR ONE MAN DAILY
In bed twenty-four hours	1,600 to 1,800
At rest but sitting most of the day.....	2,000 to 2,300
Work chiefly done sitting	2,200 to 2,800
Work chiefly done standing or walking	2,700 to 3,000
Work developing muscular strength	3,000 to 3,500
Work requiring very severe effort	4,000 to 6,000

Muscular effort does not call for any considerable increase in the intake of protein, since the wear and tear of protein is

only slightly accelerated by activity. There is, however, need of a decided increase in the purely energy-yielding foods, such as carbohydrates and fats. Cereals, vegetables, nuts, fruits, legumes, milk, and eggs offer all that could be desired in the way of tissue-building and energy-yielding material for the workingman. Attention should be paid to combinations, and anyone who is engaged in manual work should take reasonable precaution not to eat too hurriedly, and should also avoid a tendency to wash his food down with a large quantity of liquids. The workingman is also in need of a fully balanced dietary from the standpoint



L. Emile Adan

Work demands a marked increase in the amount of food eaten.

of inorganic salts and vitamins. In other words, he should use the entire grain products and the protective foods (milk, eggs, and green vegetables), which retain the full nutritive qualities of the original natural product.

FOOD FOR THE BRAIN WORKER

Carefully conducted tests have shown that mental activity does not require increased production of energy. The individual working with his mind does become tired and worn, but it is not because of excessive production of energy, as in the case of physical work. The brain worker should bear this in mind, and avoid eating too large quantities of food. He should select such food materials as will supply all the constituents necessary for

the maintenance of his tissues, including protein, salts, vitamins, and energy-yielding materials; but his total intake of calories should be toward the lower limit. The fact that little change is seen in the output in energy when a person is doing mental work indicates that physically he will suffer greatly if he neglects to do work that will exercise his muscles. This is the basis for the combination of a moderate amount of physical work with mental activity. A mental worker should do from one to two hours of hard work each day in order to keep his body in condition. This will call for some increase in ingestion of food, but will, in the long run, bring health and good resistance instead of weakness and inability to withstand disease. The brain worker should use the simpler foods, avoiding entirely the heavier dishes, such as roasts and other complicated mixtures, or partake of them in very limited amounts. As a result, his mind will be clear, and he will be able to accomplish his work in a more satisfactory way.

DIET FOR THE AGED

In old age, the nutritional changes become less intense, and there is thus less need for food. The appetite may be as strong as ever, and one has to guard against overeating. As a rule, elderly persons are less active physically, and this, too, will suggest a lighter diet. Up to about sixty years, there is in the average person a tendency to increase in weight; beyond this age, there is a gradual lessening in weight and a retardation in tissue activity.

The following table gives average weights for people advanced in years:

AGE IN YEARS	MEN Pounds	WOMEN Pounds
Sixty	144	125
Seventy	139	125
Eighty	135	113
Ninety	127	109

The decrease in food requirement as outlined by Von Noorden for the various ages is as follows:

60 to 70 years	10% decrease
70 to 80 years	20% decrease
80 and upward	30% decrease

With an elderly person, there is greater danger of excessive nutrition—that is, of overeating—than of under-nutrition. Such a person should take foods that are simple in character, avoiding an excess of protein, condiments, and stimulants. If

the food is chewed thoroughly, there is less likelihood of over-eating. The loss of the teeth in later life is a condition that must be carefully considered, as failure to masticate the food sufficiently at this time is likely to prevent the individual from properly controlling his diet. The classes of foods suited to the elderly person's needs are cereals, fruits, and vegetables, with nuts, eggs, and milk in moderation. Unless the individual is greatly enfeebled, two meals are probably better than three. High protein diet is undesirable, hence the less meat eaten the better.

INFLUENCE OF SEASON AND CLIMATE ON FOOD INTAKE

The season of the year and the climate have a marked influence over the character and amount of food that should be ingested. The following table gives some idea of the variations in the number of calories needed in different seasons and climates:

**Maurel's Table Showing Maintenance Allowance
According to Climate**

SEASON AND CLIMATE	Number of Calories per Kg. (2.2 lbs.)	Calories for 24 Hours		
		Man Weighing 60 Kgs. (132 lbs.)	Man Weighing 70 Kgs. (154 lbs.)	Man Weighing 80 Kgs. (176 lbs.)
Hot season of hot countries	30	1,800	2,100	2,400
Cold season of hot countries, and summer season of temperate countries	35	2,100	2,450	2,800
Intermediate season of temperate countries, and summer of cold countries	40	2,400	2,800	3,200
Cold season of temperate countries, and intermediate season of cold countries	45	2,700	3,150	3,600
Cold season of cold countries	50	3,000	3,500	4,000

In a hot climate or in summer, the fat used as food should be reduced to a minimum, and the carbohydrate relatively increased. If the Chittenden standard is followed, little change need be made in the use of protein; for this standard is nearer to the needs of the body, and there is not so much extra nitrogenous material used as in the ordinary program. If high protein is used, then it will be better to reduce the amount during the hot part of the season. In cold climates, the amount of fat can

be relatively increased; but there is no necessity of modifying the protein ration if the lower protein standard is followed. During the hot season, moderation in eating will protect one from digestive disturbances. Care in handling foodstuffs in the hot part of the year will prevent transmission of disease in this way, and also the possible ingestion of spoiled or contaminated foods. Fruits and fruit juices are especially indicated in the hot season. They are cooling and refreshing, and contain a minimum amount of heat-producing substance.

DIET IN SICKNESS

Fevers. The old plan was to starve a fever; but since the conditions in connection with fever have been more thoroughly understood, it has seemed best to use properly selected foods, at least to a limited extent. Liquid foods are more commonly used than any other class, milk standing perhaps first on the list. Fruit and fruit juices are also very well taken by many persons. Gruels made of cereal products are also of value. Buttermilk and yogurt may be of service in certain cases. Solid foods, especially those with high protein content, are not desirable.

Acute Illnesses. In acute conditions, it is generally best to go without food until the character of the condition is determined. Water should be taken freely, and often lemonade or some simple fruit juice may be of benefit. Of course, the latter should not be taken if there is acute indigestion. Any acute condition in connection with the digestive organs is better handled by total abstinence from food, plenty of water being used until the organs are able to perform their ordinary functions. After an attack of acute indigestion, the food first taken should be very simple and of small amount, more being added gradually as the patient can stand it.

For diet in specific diseases, see sections devoted to the same.

Diet and Nutritional Diseases

The diseases commonly classified under the heading of nutritional disorders are beriberi, scurvy, pellagra, and rickets. These disorders are also called deficiency diseases, because of being quite largely due to a dietary that is lacking in certain essential constituents. Two of these diseases, pellagra and scurvy, have been known for many years, but accurate knowledge of their cause has been wanting until comparatively recent years. In fact, most of the information as to their causation has been worked out by research laboratories since the year 1910. A large part of the data has been determined by animal experimentation, that is, by feeding animals different dietaries, and noting their nutritional condition over long periods of time. By the carrying out of these studies, certain types of food were found to be curative in cases where animals had previously been poorly fed and had developed a low grade of nutrition. Milk was found to be particularly helpful in this respect.

VITAMINES

The substances in the curative or protective foods which are active in helping the enfeebled organism are not yet thoroughly understood as to composition and properties, but they have been sufficiently well studied that definite names have been given them, thus putting them on a substantial working basis. So far, the nomenclature of these products has been somewhat varied. Funk, one of the earliest workers, named them "vitamines," and this name is chiefly in use to-day by the average individual.

McCollum, another noted worker along nutritional lines, thinks that there are two types of protective bodies, and he has named them according to their solubility. One class he calls "fat soluble A," because of its being soluble in fatty material; another class, "water soluble B," because of its being soluble in a watery mixture. More recently other workers have put forward the idea that there is a third factor, which they have called "water soluble C." These substances are present in very minute quantities in all natural food products.

The best sources of "fat soluble A" are whole milk, butter fat, egg yolks, the leaves of green plants, and the seeds of plants. The last mentioned source is the least important. Bolted flour, degerminated corn meal, polished rice, starch, glucose, sugar of milk, cane sugar, and beet sugar are practically without "fat

soluble A." When there is insufficient "fat soluble A" in the dietary of an animal, his resistance is lowered, and he becomes feeble, and eventually develops a condition of sore eyes (xerophthalmia), which may even result in blindness. If this condition has not gone too far, it can be cured quickly by the addition of a small amount of milk or butter fat to the dietary. Rickets, which is a disease of childhood, is said by some to be caused by a lack of this substance in the dietary. However, there is still some question as to whether this is the case. Wheat and corn



From McCollum's "Newer Knowledge of Nutrition"

The rations of these two rats from weaning time were exactly alike except in the character of the fat they contained. To the rat on the left was given 5 per cent of sunflower seed oil. To the one on the right was given 1.5 per cent of butter fat. Butter fat, egg yolk fats, and the leaves of plants contain a dietary essential the chemical nature of which is still unknown, that is necessary for growth or maintenance of health.

do not contain enough of the "fat soluble A" to maintain nutrition properly. They should therefore be fortified by combination with foods comparatively rich in this principle. Radishes, beets, carrots, turnips, and other root vegetables, have been shown to be below the necessary supply of this material. Muscle tissue, such as ham, chops, and steaks, is also deficient. Glandular organs, such as liver and pancreas, have a fair supply of "fat soluble A." Butter fat and cod-liver oil are rich in this constituent; but fats of the animal body, other than those of the glandular organs, do not contain a sufficient amount. Most of the vegetable oils, such as olive, cottonseed, and coconut, contain none at all. Peanut oil has a small amount, according to some workers. The method of study by which the presence or absence of these substances has been determined is called the biologic method.

As stated before, when animals are fed upon a standard dietary of purified foods known to be deficient in the essential factor, then, by the addition of various food substances, the presence or absence of the principle in the added material can be demonstrated. The condition of sore eyes which has so often appeared in feeding experiments with animals was observed in

DISTRIBUTION OF VITAMINES

The following table, compiled by the British Medical Research Committee, gives the distribution of vitamins in the commoner foods. Reference to this tabulation will help to keep the diet balanced so far as these valuable food constituents are concerned.

CLASSES OF FOODSTUFFS	Fat Soluble A, or the Antirachitic Factor ¹	Water Soluble B, or the Antineuritic Factor ²	Water Soluble C, or the Antiscorbutic Factor ³
FATS AND OILS			
Butter	+++	0	
Cream	++	0	
Cod-liver Oil	+++	0	
Mutton Fat	++		
Beef Fat or Suet	++		
Peanut or Arachis Oil	+		
Lard	0		
Olive Oil	0		
Cottonseed Oil	0		
Coconut Oil	0		
Cocoa Butter	0		
Linseed Oil	0		
Fish Oil, Whale Oil, Herring Oil, etc.	++		
Hardened Fats, animal or vegetable origin	0		
Margarine prepared from animal fat	Value in pro- portion to amount of animal fat contained		
Margarine from vegetable fats or lard	0		
Nut Butters	+		
MEAT, FISH, ETC.			
Lean Meat (beef, mutton, etc.)	+	+	+
Liver	++	++	+
Kidneys	++	+	
Heart	++	+	
Brain	+	++	
Sweetbreads	+	++	
Fish, white	0	Very slight if any	
Fish Fat (salmon, herring, etc.)	++	Very slight if any	
Fish Roe	+	++	
Tinned Meats	?	Very slight	0

¹ Antirachitic — substances preventing rickets. If these are absent from the food, young children will develop rickets, a disease in which the bones are soft and become bent and otherwise deformed.

² Antineuritic — substances preventing neuritis. When these are absent from the food, a disease called beriberi will develop. In this, the nerves become inflamed and waste. It is often accompanied by a dropsy or swelling of the limbs.

³ Antiscorbutic — substances preventing scurvy. When these are absent from the food, this disease will appear. The symptoms include soreness and hemorrhages in various mucous membranes, especially the mouth.

CLASSES OF FOODSTUFFS	Fat Soluble A, or the Antirachitic Factor	Water Soluble B, or the Antineuritic Factor	Water Soluble C, or the Antiscorbutic Factor
MILK, CHEESE, ETC.			
Milk, cow's, whole, raw	++	+	+
Milk, skim, raw	0	+	+
Milk, dried, whole	Less than ++	+	Less than +
Milk, boiled	Undetermined	+	Less than +
Milk, condensed, sweetened ...	+	+	Less than +
Cheese, whole milk	+		
Cheese, skim milk	0		
EGGS			
Fresh	++	+++	? 0
Dried	++	+++	? 0
CEREALS, PULSES, ETC.			
Wheat, Maize, Rice, whole grain	+	+	0
Wheat Germ	++	+++	0
Wheat, Maize, bran	0	++	0
White Wheaten Flour, Pure Corn Flour, Polished Rice, etc.	0	0	0
Custard Powders, egg substi- tutes, prepared from cereal products	0	0	0
Linseed, Millet	++	++	0
Dried Peas, Lentils, etc.		++	0
Pea Flour (kilned)		0	0
Soy Beans, Haricot Beans	+	++	0
Germinated Pulses or Cereals .	+	++	++
VEGETABLES AND FRUITS			
Cabbage, fresh	++	+	+++
Cabbage, fresh, cooked		+	+
Cabbage, dried	+	+	Very slight
Cabbage, canned			Very slight
Swede, raw expressed juice ...			+++
Lettuce	++	+	
Spinach, dried	++	+	
Carrots, fresh	+	+	+
Carrots, dried	Very slight		
Beetroot, raw juice			Less than +
Potatoes, raw	+	+	
Potatoes, cooked			+
Beans, fresh, scarlet runners, raw			++
Onions, cooked			+ At least
Lemon Juice, fresh			+++
Lemon Juice, preserved			++
Lime Juice, fresh			++
Lime Juice, preserved			Very slight
Orange Juice, fresh			+++
Raspberries			++
Apples			+

CLASSES OF FOODSTUFFS	Fat Soluble A, or the Antirachitic Factor	Water Soluble B, or the Antineuritic Factor	Water Soluble C, or the Antiscorbutic Factor
Bananas	+	+	Very slight
Tomatoes, canned			++
Nuts	+	++	
MISCELLANEOUS.			
Yeast, dried		+++	
Yeast Extract and Autolyzed .	?	+++	0
Meat Extract	0	0	0
Malt Extract		+ In some specimens	
Beer		0	0

man in some of the poorer districts of Europe during the war. The faulty nutrition was not attributable to lack of fat, but to lack of the essential factor that is found in such fats as butter and cod-liver oil. These fats were not obtainable at the time, and so their place was supplied by vegetable fat. As a result, the nutrition of the persons eating the deficient dietary was seriously disturbed.

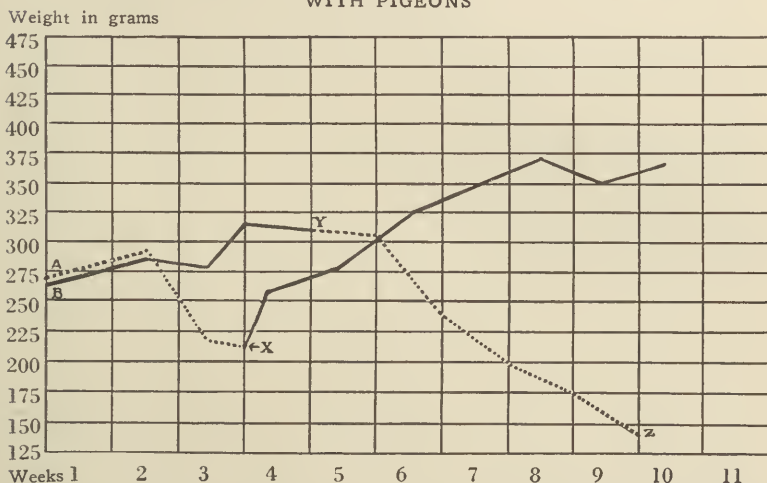
"Water soluble B" has been quite carefully studied in connection with the Oriental disease beriberi. In fact, this dietary essential was the first vitamine to be experimentally studied. It occurs more widely in plant tissues than in animals. Cereals, legumes, vegetables, fruits, nuts, yeast, eggs, and milk are its principal sources. *Milk is a fair source.* Yeast is said to be the richest source we have. Eggs and the germ of sprouted grains are next to yeast; while whole wheat, soy beans, and nuts are fairly good in their content of this "water soluble vitamine." In the cereal products, the germ and the bran are the parts of the seed which contain most of the material. One of the best methods of study in connection with "water soluble B" is the experimental feeding of birds. When birds are fed upon polished rice for from three to six weeks, they gradually develop a disturbed nutrition, with a form of paralysis called polyneuritis. This polyneuritis in birds is similar in many respects to the disease called beriberi, which is seen in human beings. When polyneuritic birds are fed upon a watery extract of rice polishings or wheat bran, the symptoms of the disease are quickly overcome, and the bird promptly regains its normal health. Similar results have been obtained in connection with cases of beriberi. (See chapter 73 for beriberi.)

It is said that the British army, during the campaign in the region of the Dardanelles, developed a number of cases of beri-

beri upon a diet consisting largely of white bread, tinned meat, and jam. Rapid improvement of the diseased men followed when a more liberal dietary was supplied.

The stability of both "fat soluble A" and "water soluble B" deserves attention. Heating foods containing these principles to high temperatures causes marked decrease in the content of dietary essentials, "water soluble B" being more easily injured

GRAPH ILLUSTRATING RESULTS OF FOOD EXPERIMENTS
WITH PIGEONS



Pigeon A was first fed polished rice. X indicates the point where marked symptoms of polyneuritis are shown, with almost complete loss of power to stand up. It was then fed bran extract followed by wheat and unpolished rice. As indicated on the graph, a quick recovery resulted.

Pigeon B was first fed the entire, or unpolished, rice. At Y it began eating polished rice. Rapid decline followed, death taking place at point Z about five weeks later.

in this way than "fat soluble A." Both A and B, however, stand a boiling temperature much better than was formerly supposed. It is the high temperatures of dry heat and of the autoclave, or closed retort, that does them the most damage. Cooking food materials in the presence of alkali, such as soda, has been shown to have a destructive influence upon vitamins, especially the "water soluble B."¹ Experimental work has proved that soda

¹ Sullivan and Voegtlin, of the United States Public Health Service, have clearly demonstrated the destructive action of alkalis on vitamins. These substances lose their physiological activity when exposed to alkalis, this being especially true at high temperatures. Their experiments were performed on chickens, one group of the birds being fed upon corn bread made by the use of whole corn meal, milk, and soda. On this food, the birds rapidly developed polyneuritis, which is typical of vitamin deficiency of the "water soluble B" type. The average time taken for the development of this condition was about seventeen days. Another group was fed upon corn bread made from whole corn meal, milk, and salt. These remained well indefinitely.

biscuits, made by the use of soda alone as the leavening agent, have their vitamins greatly reduced or destroyed. The drying of foods is also thought by some to have a deteriorating effect.

The third principle, "water soluble C," is not so thoroughly worked out as the two previously discussed. It is the constituent that has to do with the prevention of scurvy, and is more commonly called the antiscorbutic principle.

The best sources of the antiscorbutic principle are oranges, lemons, tomatoes, raspberries, lettuce, cabbage, turnips, and similar products. Raw cabbage is excellent. Lemon juice is good, also the juice of raw vegetables, such as beets and carrots. All fresh fruits are of service. Cooking and drying diminish or destroy the principle. It is also very easily destroyed by the use of alkali, such as soda. Dried beans are valueless until sprouted. Milk is not as valuable a source as fruits, and after being cooked, is considerably reduced in value. Meat is of little worth, since the principle is present in so small an amount that an excessive quantity of meat would be required to supply the need.

From the foregoing discussion, it is seen that "fat soluble A" is derived especially from milk and leafy vegetables; "water soluble B" from whole cereals and vegetables; and "water soluble C" from raw foods, notably fruits and vegetables.

SCURVY

Scurvy is a disease characterized by great loss of strength, by a tendency to bleeding from various parts of the body, and by changes in the bones which make them softer and more easily broken. It is a nutritional disease, and as has already been stated, is due to a faulty diet, particularly to diminished intake of the "water soluble C" vitamin.

The disease has been known since about the year 1500. The earliest records in regard to its occurrence were made by sailors who on long voyages were deprived of fresh foods, making their diet of salt meats and sea biscuit. Some facts in reference to the cause and cure of the disease were known as far back as 1696, but its relation to vitamin deficiency is a very recent discovery. The malady is rare at the present time, since definite lines of prevention have been so clearly worked out.

Symptoms: The chief symptoms are weakness, dizziness, fatigue, pains in the feet and legs, diarrhea, hemorrhages from gums, skin, nose, intestinal tract, and other parts of the body, and anæmia. At times, the disease is difficult to diagnose correctly, not all the symptoms being present so as to give the typical picture.

Treatment: This consists in feeding the patient liberal quantities of antiscorbutic foods, such as fresh fruits, especially oranges, lemons, limes, apples, and grapes, and fresh vegetables, such as cabbage, carrots, turnips, onions, and potatoes. Germinating seeds can be used to advantage if no other products are on hand. Medicine is of no value in this disease. Hope of recovery is poor unless liberal amounts of the proper foods are available. With the proper food, practically all cases recover.

Infantile Scurvy. Infantile scurvy should be mentioned, since it is more likely to occur than the form to which adults are subject. This disease occurs in infants during the early months of life, generally between the third and eighteenth months. It comes on slowly, with digestive disturbances, failure in growth, especially of the long bones, paleness of the skin, and hemorrhages from gums, skin, and mucous membranes. The disease is caused by failure to supply the antiscorbutic principle in the food, as is often the case when the child is fed upon prepared foods with the exclusion of fresh milk. It can be cured quickly, in the great majority of cases, by feeding suitable foods, such as fresh milk, orange juice, grape juice, and scraped apple.

PELLAGRA

Pellagra has received considerable attention from students of nutrition in the last few years. It began to appear in the United States in the year 1880, or about the time when the highly milled flours and cereal products were introduced. It is now seen particularly in some parts of the Southern States. In 1917, the number of pellagrins in the United States was estimated at 165,000.

Causes: The disease is most prevalent at the end of winter, indicating that lack of proper food is the real basic cause. In our Southern States, many of the poor live upon corn bread, pork, and molasses as their chief foods. Persons who eat much carbohydrate and little protein seem to be most likely to contract the disease. Corn bread, corn grits, potatoes, soda biscuits made from bolted flour, and molasses are foods which, when they make up the major part of the diet, are evidently at fault, as these foods are deficient in vitamins. A distinction must be made here between whole corn meal and the refined product, the latter being most involved in causing the disease.

Goldberger, working under the United States Health Service, seems to have proved the dietary basis as the chief cause of pellagra. He has produced the disease by giving a dietary consisting of degerminated corn meal, bolted wheat flour, rice starch, sugar, pork fat, sweet potatoes, cabbage, collards, turnip

greens, and coffee. He has then cured the condition by liberal amounts of milk, eggs, and meat. Chittenden and Underhill have performed experiments on dogs in connection with the study of pellagra, giving them a diet of crackers, cooked dried peas, and cottonseed oil. By such a dietary, symptoms closely resembling those of pellagra in man were developed. These men believe that the trouble produced in the animal was due to lack of "water soluble B." The real basis in relation to the vitamins has not been fully decided yet. It seems that usually the dietary of the pellagrin is low in protein, and the proteins are of a poor quality. There is generally a deficiency of "fat soluble A," and a limited supply of certain mineral salts, particularly those of lime and soda.

It is thought by some that pellagra has a bacterial basis as well as a dietary one, and that the poor dietary lowers the resistance of the individual sufficiently to allow the infection by bacteria to take place. Whatever the real causative factors are, the dietary is a most important problem in dealing with these cases; and those who are living on a low grade dietary should consider their own program carefully, so as to avoid contracting disease. The fact that pellagra began its inroads upon the people of the United States soon after the highly milled products were introduced indicates that diet is certainly a potent factor in the cause of the disease.

Symptoms: The following symptoms characterize pellagra: loss of strength; nervous manifestations, such as headache, nervousness, and dizziness; indigestion; irregularity of the bowels, varying from constipation to attacks of diarrhea; redness on the tongue and of the mucous membrane of the mouth; an eruption on the skin, especially on the backs of the hands and the upper surface of the feet; and in the later stages of the disease, mental disturbances are frequently seen.

Treatment: The treatment of this disease is chiefly dietetic. In fact, it has been said, "Without dietetic measures, all remedies fail." The liberal use of milk, eggs, green vegetables, fresh fruits, cereal products made of the entire grain, and peas and beans used in the form of *purées*, will give excellent results in dealing with these cases. Regularity in feeding, and hygiene in general, are very important points to follow closely. Hygiene of the mouth is of special value, and should include the use of cleansing mouth wash and proper attention to the teeth.

RICKETS

Rickets is the most common of the nutritional diseases that affect children. It is characterized by the loss of mineral salts

from the bones, with deformity. There is also restlessness and a tendency to convulsive attacks.

This disease occurs most commonly in children ranging from six to twenty-four months in age, chiefly among the poorer classes.

Cause: The cause has not been fully worked out, but lack of breast feeding is evidently the foremost factor. It has been thought by some to be due to vitamine deficiency, and has been said to be definitely attributable to lack of "fat soluble A"; but this deficiency alone does not seem to be the full explanation of the trouble. There is apparently marked inability to handle the foods that are used, with the result that poorly oxidized waste products are formed in the tissues, some of which are acid in character and require lime and other of the mineral elements in the body for their neutralization. This depletes or uses up the mineral elements, with the result that the bony structures of the body are weakened. Other tissues also undoubtedly suffer, but the bony structures appear to show the trouble in a way that is most easily recognized.

Symptoms: The chief symptoms are as follows: restlessness, irritability, delayed eruption of the teeth, failure of the bones of the head to close properly, soft spots in the bones of the head, with irregularity in the shape of the head, muscles flabby and weak, the long bones enlarged at the extremities and often deformed, beading of the ribs, prominent abdomen, sweating of the head, frequent occurrence of convulsions and enlargement of the lymphatic glands. Not all of these symptoms are present in a given case, but the failure in connection with the bony development of the body is usually sufficiently characteristic to make clear the character of the disease.

Treatment: This consists in proper hygiene, especially in connection with the housing problem, breast feeding if the child is of that age, the use of milk, cereals, fruit juices, and vegetables in amounts suitable to supply proper calories and proper vitamins, and the feeding of products that will furnish liberal amounts of "fat soluble A." Cod-liver oil has been used for this purpose by many, as it is one of the richest sources of that type of vitamine; but sufficient of that dietary essential can doubtless be obtained from sources other than cod-liver oil.

Recently some very remarkable discoveries have been made regarding the influence of light upon this disease. Exposure of the body of a child or an experimental animal suffering from rickets to the direct action of sunlight or of the carbon filament electric light brings about rapid recovery in connection with the administration of an ordinary diet.

PROTECTIVE FOODS

McCollum has called attention to the fact that there are three especially *protective* foods in nature. These are milk, eggs, and green vegetables. He also calls attention to the fact that the Chinese, the Japanese, and other Oriental peoples use greens quite largely as their protective food. They are small in stature; and on the average, their scientific attainments are inferior to those of Western nations. On the other hand, Americans and Europeans have used both milk and green vegetables to a large extent; and their stature, mental development, and scientific attainments are superior to the average. It seems quite possible that the diet is one of the prime agencies in this development. In view of all the facts that have been worked out in regard to these food constituents, it is clear that we should make sure to select a dietary reasonably near to nature, and that we should avoid the use of too many of the prepared foods, since a preponderance of these in the dietary will fail to furnish the essentials for the best physical development.

The following rules will help to prevent deficiency in diet, and thus guard against the possibility of attack by the nutritional diseases:

1. Use milk and cream and their products freely.
2. Use eggs in moderation.
3. Use entire wheat flour in place of the common white variety.
4. Use greens, such as lettuce and spinach.
5. Use fruits and fresh vegetables frequently.
6. Use natural rice instead of the polished variety.
7. Use whole corn meal instead of the refined product.
8. Use peas, beans, and lentils freely.
9. Avoid an excess of canned foods.
10. Avoid complicated mixtures of food, but vary the menu from day to day.

The following lists of foods will help in the selection of a dietary including these different products:

Foods Rich in "Fat Soluble A"	Foods Rich in "Water Soluble B"	Foods Rich in "Water Soluble C"	Foods Deficient in Vitamines
Cream	Cereals	Orange Juice	White Flour
Milk	Legumes	Lemon Juice	Polished Rice
Butter Fat	Spinach	Grape Juice	Cane Sugar
Eggs	Cabbage	Fresh Fruits	Milk Sugar
Spinach	Potatoes	Green Vegetables	Starch
Cabbage	Carrots	Root Vegetables	Sirups
Carrots	Nuts	Tomatoes	Canned Goods
Yellow Corn	Lettuce	Fresh Milk	Refined Corn Meal
Sweet Potatoes	Tomatoes	Potatoes	Vegetable Oils
Lettuce	Yeast	Cabbage	Glucose
Wheat Germ	Eggs		

Preservation and Adulteration

The preservation of food is an old practice, having been in vogue in one form or another for many centuries. The usefulness of such a custom lies in the fact that it facilitates the storing of foods for winter consumption, and their transference from one section of country to another in case of food shortage or to give a wider variety of foods to a given area. Modern city life, which is gaining on the rural communities, calls for the use of these methods on an ever increasing scale, as sufficient fresh foods to keep such large populations properly supplied cannot be furnished. The ability to preserve food is an invaluable asset in the maintenance of food supply; and modern knowledge of the causes of fermentation, specially of the action of germs, has given the foundation for the industry as now carried on. But although the preservation of food is so valuable a process, it has some disadvantages, the chief of which is the deteriorating influence it has upon the product. However, methods of food preservation are at the basis of most food industries.

METHODS FOR PRESERVING FOODS

The various methods employed in the storage and keeping of foods can be classified under the following heads:

1. Physical
2. Chemical
3. The use of preservatives

1. PHYSICAL METHODS

Drying, heating, and cooling are the physical processes used, and each is well adapted to certain types of food. Drying is one of the oldest methods in use, and its success lies in the fact that bacteria do not thrive without moisture. This method is often seen in nature, the drying of seeds after they have ripened being an excellent example of the process. Seeds remain intact for very long periods when kept free from moisture; but as soon as water is applied, the seed decays, or if other conditions are favorable, it begins to grow. The drying method is particularly valuable in connection with the preservation of fruits and vegetables. In hot, dry climates, the process can be carried out in the open air, use being made of the heat of the sun. In other localities, where climatic conditions are not so favorable, the indoor methods are available. Evaporators are built for this

purpose. These are simply cabinets of varying size, which are so constructed that the air caused to circulate through them is heated to a fairly high temperature, removing the water from the food rapidly. In preparing such foods as sugars in this way, the evaporating process is carried on inside of a chamber from which the air is exhausted partially. By this means, the moisture is removed at a lower temperature, thus preventing the product from being damaged by the heat.

The next most commonly used physical method is the application of cold. At low temperatures, bacteria are not destroyed, but they are at least prevented from growing rapidly.

Some classes of food will bear the freezing temperature.

This is true of meats; but other kinds of food, such as fruits and vegetables, are damaged by freezing. For the last mentioned articles, it is better to maintain the temperature slightly above the freezing point. Indeed, all foods stand temperatures of this range better than the colder ones. The use of cold is specially valuable, as it can for a short time maintain the substance very near to its original form. Prolonged refrigeration is likely to cause deterioration, even in the best foods. Although bacteria do not thrive well in foods preserved in this way, yet they are not destroyed; and when the product is removed from the cooling chamber, it is susceptible to more rapid decomposition than before it was put into the refrigerator. In the use of the ice box, or refrigerator, the following points must be observed if the best results are to be obtained: The ice chamber and the food section should be kept absolutely clean. This is important, as the ice supply may be exhausted temporarily, and at that time, an unclean box offers a good opportunity for rapid growth of bacteria. It is better not to wrap the ice in paper or cloth. The chest should be kept dry and well ventilated. Keeping the chamber filled with ice is more economical than to let it get low or entirely empty before adding a fresh supply.



The preservation of food is an old practice, having been in vogue in one form or another for many centuries.

A third commonly used physical method is the application of heat in the destruction of bacteria. The product thus treated may then be placed in an air-tight container and be preserved for a long time. This is the basis of the canning industry, which was first successfully carried out by the French in the year 1810.¹ At the time when the process was first developed, the principle involved in its use was not fully understood; but later, through the work of Pasteur and others, the real basis was clearly established in the discovery of bacterial fermentation. Bacteria are very susceptible to high temperatures; and when food is heated sufficiently, they are all destroyed. Then, by prevention of their entrance again from the outside, the food is kept from spoiling. Heat is also used in keeping foods for short periods, as in sterilizing milk and heating over foods left from a previous meal.²

2. CHEMICAL METHODS

By this method is meant the use of certain chemicals in large quantity as preservative agents. One of the oldest of these methods is the smoking process. This is employed especially in connection with meats. By the application of smoke to the food product, such chemicals as creosote, guaiacol, acetic acid, and formaldehyde are formed, all of which are more or less active as disinfectants. This type of preservation will not prevent all types of bacteria from growing, but ordinarily will keep the meat thus treated, for a fair length of time.

The use of sugar is also one of the chemical methods. Sugar, when present in large amounts, is capable of preventing bacterial

¹ Pamphlets in regard to home canning may be obtained from the following address: Division of Publication, U. S. Department of Agriculture, Washington, D. C.

² Outline of Important Facts in the Canning Process

1. All containers and utensils used in the canning process must be effectively sterilized. This includes cans, tops, rubber seals, dippers, funnels, and spoons.

2. All products to be canned should be so prepared as to exclude, as far as possible, any contaminating agent.

3. The products thus prepared must be sterilized thoroughly by cooking in a large kettle before they are introduced into the final container; or by filling the container, screwing the tops on loosely, and then heating the container and contents in a wash boiler or similar receptacle filled with water. By this process, all yeasts, molds, and bacteria are destroyed. Rarely some very resistant forms of bacteria are present, which require what is called fractional sterilization; that is, heating on successive days, thus allowing these resistant forms to develop, after which they are easily destroyed by the boiling process.

4. Sugar may be added to fruits to the extent of one third the product canned, in case the fruit is acid, or one sixth the bulk if it is low in acid content. This additional sugar helps greatly in preventing bacterial action in the fruit, but is not an essential factor, since fruit keeps perfectly if care is taken in the process of sterilization.

5. The container should be perfectly sealed at the end of the process of sterilization, so as to prevent the entrance of air into the canned goods. This can be tested out by inverting the containers for several hours, giving opportunity for any leak to make its appearance.

6. Vegetables, such as corn, peas, beans, pumpkins, beets, and sweet potatoes, are difficult to keep, and must have special attention if good results are expected. The more acid fruits keep better than the subacid varieties.

7. Chemical preservatives, which are advertised as very helpful preparations in the keeping of canned products, and frequently used, being added to the food product at the time of canning, are unnecessary, and are often injurious to those who partake of them.

growth; but the method is not desirable, for several reasons. The amount of sugar used is large. Often, in the use of this process with fruits, an equal amount of sugar and fruit is necessary, and thus the expense is large. The taste of the preserved product is also modified so markedly that the method has been largely superseded by canning.

Salt also is used as a preserving chemical. This method is an old one, having been employed for many years, specially in keeping fish. Salt readily enters the substance to be kept, but is likely to alter the composition of the material, rendering it less easily digestible; and at the same time, the flavor is affected to some extent. Spices and condiments, such as cinnamon, cloves, and mustard, have been used as preservatives; but at present, they are not thought to be of great value for that purpose. These preservatives are injurious to the digestive system, and they should not be used by those who are anxious to maintain the best health. The use of the condiments is not restricted by law, however, as is the case with many of the other chemicals.

USE OF PRESERVATIVES

A number of chemicals have been added to foods in minute quantities to lessen the likelihood of bacterial development. Preservatives are undesirable, even though in some cases they may be harmless of themselves; for they encourage the careless handling of foods, and also the use of products that are undergoing decomposition at the time when they are put up for human consumption. Our recent pure food laws control the use of these chemicals to a considerable degree, but they are used still to some extent. However, the ruling of the government protects the consumer from their excessive use, and also gives him opportunity to know whether they are used, as foods thus preserved must be labeled to indicate the presence of the extraneous material. Certain of the preservatives formerly used are now prohibited. Another point against them is the fact that any substance capable of lessening bacterial growth is likely to inhibit the action of the digestive enzymes or ferments. The chemicals in this class that have been most used are the following: benzoates, boric acid and borates, sulphurous acid and sulphites, salicylic acid and salicylates, and formaldehyde. Some of these are not now allowed, because of their harmful character.

ADULTERATION OF FOODS

The term "adulteration" is defined in the government literature as follows: "Anything which makes a food unwholesome or lowers its nutritive value is usually considered adulteration."

A food is classed as adulterated, according to the Pure Food Law of June 30, 1906 (upon which practically all other food laws have been based), when one or more of the following conditions are present:

1. If any substance has been mixed or packed with it so as to reduce or lower or injuriously affect its quality or strength.
2. If any substance has been substituted, wholly or in part.
3. If any valuable constituent has been wholly or in part abstracted.
4. If it is mixed, colored, coated, powdered, or stained in a manner whereby damage or inferiority is concealed.
5. If it contains any added poisonous or other added deleterious ingredient that may render it injurious to health.
6. If it consists in whole or in part of a filthy, decomposed, or putrid animal or vegetable substance, or any portion of an animal unfit for food, or if it is the product of a diseased animal, or one that has died otherwise than by slaughter.

It would be difficult, in a chapter of this character, to consider all the possible types of adulteration that might be used; but a few examples will suffice to illustrate possibilities in this connection. Butter has been in the past, and possibly it is still — though rarely — adulterated with oleomargarine, a fat obtained from beef tallow. The ruling in regard to this matter is very strict, however; and any product containing oleomargarine, if it is to be used as butter, must be labeled so that its true character will be known. The use of coloring matter in butter is another example of adulteration that is not so carefully guarded.

Confectionery is one of the types of food material which have been freely adulterated with such substances as terra alba (white clay), barites, talc, chrome yellow (a lead compound), liquors, and narcotic drugs. These adulterants are all specifically mentioned as unlawful. Honey has been a field for the use of adulterants, among them glucose and ordinary sugar, which of themselves are not objectionable, but when they are added to honey, the resulting product is not up to the standard. Milk is a food of the greatest value, which has been adulterated by numerous methods, such as the addition of water, the removal of the cream partially or completely, the addition of preservatives and artificial color, the addition of thickener, and the use of soda in overcoming a condition of sourness.

TABLE OF FOOD ADULTERATIONS

The following table has been selected from Bulletin 25, United States Department of Agriculture, Division of Chemistry, and

gives a number of the more common food products, with the most common forms of adulteration:

ARTICLES	DELETERIOUS ADULTERANTS	FRAUDULENT ADULTERANTS	ACCIDENTAL ADULTERANTS
Arrowroot		Other starches which are substituted in whole or in part for the genuine article	
Bread	Sulphate of alum	Flours other than wheat, inferior flour, potatoes	Ashes from oven, grit from mill-stones
Butter	Copper	Water, other fats, excess of salts, starch	Curd
Canned Vegetables and Meat	Salts of copper, lead	Excess of water	Meat damaged in the process of canning
Cheese	Salts of mercury in the rind	Oleomargarine	
Candy and Confectionery	Poisonous colors, artificial essences	Grape sugar	Flour
Cocoa and Chocolate	Oxide of iron and other coloring matters	Animal fats, starch, flour, and sugar	
Flour	Alum	Ground rice	Grit and sand
Honey		Glucose, cane sugar	Pollen of various plants, insects
Lard	Caustic lime, alum	Starch, stearin, salt	
Milk	Water	Burnt sugar, annatto	Sand, dirt
Meat	Infested with parasites		Tainted
Fruit Jellies	Aniline colors, artificial essences		
Oatmeal			Old and wormy
Preserves	Aniline colors	Apples, pumpkins, molasses	Sand
Sago		Potato starch	
Sugar	Salts of tin and lead, gypsum	Rice flour	Sand and dirt, insects dead and alive
Vinegar	Sulphuric, hydrochloric, and pyro-ligneous acids		

MISBRANDING OF FOOD

The misbranding of food is another feature of food control which is as important to the average individual as adulteration. "To offer a food under false or misleading claims as to its source, kind, quality, or amount is usually called misbranding." According to the law, a food is deemed to be misbranded:

1. If it is an imitation of, or offered for sale under the distinctive name of, another article.

2. If it is labeled or branded so as to deceive or mislead the purchaser, or purports to be a foreign product when not so, or if the content shall have been substituted in whole or in part, or if it fails to bear on the label a statement of the quantity or proportion of any narcotic or habit-forming drug it contains.

3. If, when sold in package form, it fails to bear the correct statement of weight, measure, or numerical count of its contents; provision being made for reasonable variation and for certain exemptions.

4. If the package containing it, or its label, shall bear any statement, design, or device that is false or misleading in any particular.

ARTIFICIAL COLORING MATTER

The coloring of food to give it a more desirable appearance is a process that has been employed for a long time, and is still practiced to some extent. Several types of coloring matter are used, including vegetable, animal, and mineral dyestuffs. The products most frequently adulterated in this way are candies, vegetables, and butter. Cochineal, annatto, turmeric, logwood, saffron, and carrot juice are examples of those which are said to be harmless. Many other coloring substances, such as the aniline dyes, copper sulphate, Prussian blue, and the like, have been used; but the great majority of these are considered to be harmful. Of the aniline dyes, certain ones are recognized as harmless when used in a way that will not damage the food or render it of inferior quality. The following aniline dyes are allowed by the pure food laws:

1. Red shades: 107 amaranth, 56 ponceau 3R, and 517 erythrosin
2. Orange shades: 85 orange I
3. Yellow shades: 4 naphthol yellow S
4. Green shades: 435 light green S. F. yellowish
5. Blue shades: 692 indigo disulfoacid

In the main, the use of color stuffs in food is intended to make inferior food look pleasing and superior. These substances are usually present in very small amount; and in many instances,

so far as their own properties are concerned, they are harmless. In the case of the aniline dyes, the amount used is rarely more than one part in one hundred thousand. Such a quantity is insignificant when the nonpoisonous forms are used; but the use of dyes to make a poor food look better is certainly undesirable, and should be discouraged by refusal on the part of the consumer to buy foods thus treated. Introduction of color stuffs into foods makes it more difficult to determine the quality of the article. Thus it would seem, from all viewpoints, that the use of colors in foods is a practice that should be condemned. The purchaser and consumer should realize more what such methods mean; and when the real significance is understood, they should select food accordingly.

ARTIFICIAL SWEETENERS

The discussion of food adulterants would not be complete without consideration of the chemical substances that are used as sweetening agents in the place of the sugars. The most common of these is saccharin, a white solid that is some three hundred times sweeter than ordinary sugar. It has no food value, and is an irritant to the digestive tract. It is thus objectionable as a constituent of foods, and its use in the manufacture of such products is now prohibited.

Vegetarianism

The first diet given to man was vegetarian in character. This is made clear in the Biblical record, in the statement, "And God said, Behold, I have given you every herb bearing seed, which is upon the face of all the earth, and every tree, in the which is the fruit of a tree yielding seed; to you it shall be for meat." Genesis 1:29. Even yet, after the years of the curse have rested so heavily upon the earth, there is no question but that a maintenance diet can be obtained from purely vegetable sources. The selection of such a dietary, however, requires considerable knowledge and care, so as to be sure to make it include all the constituents necessary for complete nutrition.

The lacto-vegetarian dietary (milk and milk products and plant foods) is acknowledged by experts on the food question to be ideal for man, as conditions now exist; and the difficulties in making such a dietary balance are much less than those encountered in connection with a purely vegetable diet. Milk acts as a protective food, since it is well supplied with certain salts and vitamins, together with each of the common food elements, namely, protein, fat, and carbohydrate. The greater number of so-called vegetarians are of the lacto-vegetarian type. Some have objected to the use of milk as a food, and have done so with considerable argument behind them, on the basis that milk is likely to transmit disease. There is indeed a great deal of disease in cattle at the present time, particularly tuberculosis; and we need to think of the question seriously. In fact, it seems unwise to use milk as produced under ordinary conditions, without first properly sterilizing it by either boiling or Pasteurizing.

The value of milk is recognized many times in the Bible, in the description of the promised land, which is declared to be "a land flowing with milk and honey."

The Good Book does not recommend flesh foods as ideal. Instead, it seems clearly to indicate that they are not as desirable as are the foods which come from vegetable sources. Vegetable foods are first-hand products; whereas meats may be considered as secondhand, since they have already been built into animal tissues.

PROTEIN STANDARDS

The problem of vegetarianism is regarded by some as simply a problem dependent upon intake of protein. Even from this viewpoint alone, the vegetarian side is clearly vindicated; and

this is beyond question when milk is combined with the other foods. A mixed diet — that is, one which supplies meats along with vegetable products — gives a high protein ration; for meat is rich in the latter element, and even very little of it adds materially to the total of that food element. Such a diet conforms more closely to the older views of diet, which set 15% to 20% of the total calories eaten as the standard of protein intake.

This high protein dietary, as it is called, is championed by such men as Voit, Rubner, and Atwater, these men allowing from 118 to 127 grams of protein a day, or about 500 calories. Figuring on the basis of 2,500 calories a day, this would give 20% protein. Chittenden, on the other hand, after studying the problem carefully, has concluded that a lower protein standard is more satisfactory. He allows about 10% of the total calories in the form of protein. This ratio is easy to get when using a vegetarian ration, but difficult to maintain when flesh foods are eaten, the flesh foods carrying the protein to a higher point when even moderate amounts of meat are eaten.

ENDURANCE TESTS

“Will the low protein supply give one energy and endurance to do heavy work?” is a question that has troubled many individuals. Again, will the food elements in the vegetarian diet give sufficient material to keep the body in good working order? Numerous tests have been carried out in recent years, to determine whether it is really possible for a person to do his work on the lower standard; and enough has been done to prove conclusively that the vegetarian basis is a safe one from all viewpoints. The experiments by Irving Fisher, professor of political economy at Yale University, are among the most conclusive. The following tabulation gives in brief a summary of some of the more important results obtained in Fisher's experiments:

CLASS OF INDIVIDUALS	Arm Holding ¹		Deep Knee Bending ²		Leg Raising ³	
	Number of Persons	Average Record	Number of Persons	Average Record	Number of Persons	Average Record
Flesh Eaters						
Athletes	15	10 min.	9	383 times	6	279 times
Flesh Abstainers						
Athletes	19	39 min.	16	927 times	6	288 times
Flesh Abstainers						
Sedentary ..	13	64 min.	5	535 times	1	74 times

¹ The arm-holding tests were made by having the individual tested stand erect and hold both arms out horizontally as long as he could do so.

² The deep knee-bending tests were made by having the person tested stand erect, then bend the knees, letting the body down so as to touch the heels, and then rise again.

³ The leg-raising tests were made by having those tested lie upon the back on a table or the floor, and lift the legs both together to form a right angle with the body, then let them down.

These tests are certainly decisive so far as endurance is concerned, and lead to the conclusion that a person can do more work on a non-flesh program than he could if eating flesh foods. Professor Fisher says, "Meat eating and a high protein diet, instead of increasing one's endurance, have been shown, like alcohol, to actually reduce it." The explanation of these results undoubtedly lies in the fact that less nitrogenous waste accumulates in the tissues of the one on a low protein standard; and, further, the one who uses flesh foods takes in some of these waste products already formed in the meat itself, in addition to what are formed in the disintegration of the food as it is used to supply the needs of the body.

MEATS A SUBSTITUTE FOR NUTS

We are commonly led to believe that the nitrogenous foods, such as legumes and nuts, are meat substitutes. In the light of the original diet as stated in the first paragraph of this chapter, it seems clear that the opposite is in reality the truth; that is, meat has been brought in as a substitute for the other nitrogenous foods. Nuts are more nourishing than meat, since they not only contain liberal amounts of protein, but they are also rich in fat, and many of them have carbohydrate in fairly good amount. The last mentioned element does not occur in meats in sufficient quantity to be recognized as a food. The person who uses nuts as his protein source is not nearly so likely to overeat on nitrogenous material as the one who uses meat. The legumes, although not furnishing protein of as good character as nuts, are also excellent as nutrients of this type, and when properly combined with other foods, make a staple of diet able to take the place of flesh foods.

MEAT A STIMULANT

The presence, in meats, of certain chemical substances (purine bodies, creatine, *et cetera*) that have a definite stimulating power upon the body, doubtless partially accounts for their very common use as foods. These substances found in flesh foods are quite closely related to caffeine of coffee, and in some respects have similar stimulating effects. They are not poisonous in the way that caffeine is, however, and cannot be compared in every detail to the latter. These stimulating principles are not found to any great extent in vegetable foods, as they are in large part due to tissue activity. The occurrence of these principles in meat has undoubtedly led to the belief that this food is capable of helping one to do more work. The actually available material for the production of energy is probably not as great with the high standard of protein as with the lower standard, since the

work of handling the protein in the way of digestion is greater than that of handling the energy-yielding foods, such as fat and carbohydrate.

ECONOMIC VIEWPOINT

The vegetarian dietary is the most economical that one can follow. For example, one pound of beans at ordinary prices costs 6 cents, or less than 4 cents per 1,000 calories; while one pound of meat costs approximately 20 cents, making 1,000 calories cost about seven times as much, or slightly over 27 cents.¹

Comparing the protein yield of the two foods, we find that one pound of meat yields 395 calories, and one pound of beans yields 418. The following table gives a few of the common foods arranged in a manner to show comparative values from the economic standpoint:

FOOD	Cost in Cents per Pound	Cost in Cents per 1,000 Calories	Calories Protein per Pound	Total Calories per Pound
Corn Meal	4	2.4	171	1,655
Oatmeal	6	3.2	299	1,856
Beans	6	3.7	418	1,600
Irish Potatoes	2	5.2	41	387
Peanut Butter	15	5.3	543	2,825
Bread	7	5.8	181	1,142
Milk	6	18.5	61	323
Eggs	18	26.0	248	691
Meat (lean)	20	27.4	395	730

MEAT AN ACID-FORMING FOOD

Foods may be classified according to the character of the ash produced when they are burned. It is found, on this basis, that meat yields an excess of acid-forming over the base- or alkali-forming elements. A similar production of acid-forming elements takes place in the body when meats are used as food. These are undesirable products if present in excess. When eating a heavy meat diet, such as is usually eaten by the average individual who uses meat, it is often difficult to avoid taking an excess of the acid-forming principles. A marked excess of acid-forming foods entering the body is unfavorable to the best bodily health. The cereals also are acid-producers in character, but less so than meat; and in a vegetarian ration, their acid-forming power is overbalanced by the base, or alkali, of vegetables and fruits.

MEAT A PUTREFACTIVE FOOD

Experimental studies have shown that meat is the most favorable food for the development of putrefactive bacteria in the intestinal tract. (See color plate, page 21.) The products of this

¹ Market prices may change, but relative food values are fairly stable.

type of germ are especially detrimental to the body. Vegetable foods show much less favor to the growth of these organisms. In fact, experimental studies have shown that such foods as a rule do not promote the growth of the more harmful germs. Meat generally contains numerous germs, and their presence hastens the process of decomposition whenever conditions are favorable for their development in the digestive tract. Thus it is easily seen that a high protein ration consisting of meat products is conducive to the development of injurious bacteria, which in turn yield poisonous materials to be absorbed and carried to the delicate tissues of the body. It is also known that protein of animal origin is much more susceptible to bacterial activity than vegetable food, even outside the body; hence there are many more cases of ptomaine poisoning from meat than from foods of vegetable origin.

PREVALENCE OF DISEASE IN ANIMALS

Here again meats are less desirable than the vegetable products. Animals are afflicted with a number of diseases that can quite easily be transmitted to human beings. It has been given as a conservative estimate that ten per cent of the cattle of the United States are tuberculous. Some argue that cooking the meat destroys all bacteria. This in many instances is not true, for many cooks do not thoroughly cook meats; and even when the process is quite well carried out, the central portion of the piece is not as highly heated as the outer portion, and as a result, some of the more resistant forms of bacteria escape the destructive effects of the heat. Even though the germs of the disease process are destroyed, the body of the afflicted animal is not suitable for food, as there are present in the tissues poisonous substances that cannot be destroyed by the heat. Hogs are commonly afflicted with tuberculosis; and since pork is often eaten without sufficient cooking, there is quite a possibility of the transmission of the disease to those who partake of the diseased flesh. There are other diseases to which animals are subject, which are very readily communicated to man, among them the parasitic diseases such as tapeworm and trichina. (See chapter 30.) These parasites are most frequently introduced into the human body by insufficiently cooked meats. The heat of cooking, if the process is thorough, will destroy the parasites.

HIGH PROTEIN A CAUSE OF THE DEGENERATIVE DISEASES

During recent years, the chronic or degenerative diseases have been increasing rapidly. These diseases are mostly characterized

by destructive changes in the cells of certain organs of the body, such as the kidneys, the liver, the heart, and the brain. Considerable evidence has already been produced to show that these diseases are due in part at least to the excessive ingestion of nitrogenous foods. Experimental work along this line has already been begun upon animals, and the results thus far obtained show that an excess of protein is hurtful to the kidneys.

The damaging effects of high protein are particularly serious with elderly people. Oftentimes an individual well advanced in years, who is unable to continue his usual activity in the way of work, still partakes of a heavy dietary, including large amounts of protein; and as a consequence, waste products accumulate, which are injurious to the tissues, and serious destructive changes in the organs develop. The marked increase of kidney disease, heart disease, apoplexy, hardening of the arteries (arteriosclerosis), and kindred affections are to a large degree attributable to an excessive use of protein, especially that of flesh origin. Another element in the harmful effects of meat products is the fact that a comparatively small residue is left after they are digested, whereas with a vegetarian diet there is more or less cellulose or woody fiber residue, which stimulates the intestinal movements. In other words, the vegetarian program gives a bulkier residue in the intestinal tract, which is a favorable factor in the maintenance of elimination. One of the best methods for the treatment of chronic intestinal stasis, or chronic constipation, is largely based upon the use of foods that give residue of sufficient bulk to stimulate the intestinal movements.

CANCER IN RELATION TO MEAT EATING

Dr. Bulkley, in his book, "Cancer, Its Cause and Treatment," calls attention to some very interesting statistics which seem to indicate a possible relation of diet to the cause of cancer. He states that during the past fifty years, the consumption of meat in England has doubled, making the yearly consumption an average of 130 pounds per capita, while during the same period, cancer has increased fourfold. In Ireland, where the consumption of meat has been much less, only about 40 pounds per capita, the death rate from cancer is much lower. In Italy, where the amount of meat used is very small, cancer is still lower in mortality rate. Places where vegetarianism prevails show a very infrequent occurrence of cancer. In the United States, where meat is eaten to the average extent of 172 pounds per capita, the mortality from cancer is high, and is on the increase from year to year. The fact that the majority of cancers occur in connection with the digestive organs is also good evidence

that diet may have a bearing upon the subject. It should also be remembered that tea, coffee, alcohol, and tobacco may have some effect upon the incidence of the disease. In view of these statistics, it seems quite probable that meat eating does bear some relation to the cause of the disease; but as yet we are unable to give with certainty the scientific data to corroborate the assertion. (See chapter 77.)

IS MEAT A NECESSITY?

As stated in the beginning of this article, one can obtain a dietary capable of complete nutrition from purely vegetable foods when care is exercised in their selection. By including milk with such a dietary, it is easier to make up a balanced ration. The lacto-vegetarian ration thus produced is recognized by our leading research men as the ideal for proper nutrition.¹ Such a dietary supplies every element necessary for the maintenance of the body even when the heaviest kind of work is done. The evidence from all angles seems to be in favor of a vegetarian dietary fortified by the use of milk and its products.

¹ The Inter Allied Food Commission Report, London, July 8, 1918, said: "It is not desirable to fix a minimal meat ration in view of the fact that no absolute physiologic need exists for meat, since proteins of meat can be replaced by proteins of animal origin, such as those contained in milk, cheese, and eggs, as well as by proteins of vegetable origin."

Section VI—The Digestive System

CHAPTER 26

Physiology of Digestion

The digestive system is necessary to change the food we eat to such a simple form that it can be passed through the lining membrane of living cells, there to be used for nourishment. Obviously, this nourishment is required for the production of energy; that is, the growth of the cell and the manifestations of life which it presents. Such substances as water, salts, and dextrose are in a condition for immediate use. No elaborate digestive system is needed to simplify them further. If we could subsist on such a dietary, our Creator would have constructed us more after the pattern of some of the lower forms of life which require no digestive organs. Their food is prepared outside the body, and is all ready for absorption and use by the cell.

But the bulk of our nourishment comes to us in a very complex form. Our protein is bound up in such a way that no cell could get any good from it. In fact, the protein particle (molecule) could never get into the cell. It is too big and unwieldy to be admitted. It must be broken down chemically. The cell is, furthermore, very particular as to what carbohydrates are admitted. It has decreed that nothing but dextrose shall be accepted as fuel from this source; and as we ingest carbohydrates for the most part as starch, cane sugar, milk sugar, *et cetera*, they must all be worked over and presented in the acceptable form. Our fats are tied to glycerin; and before they can get through the cell wall, they must, for some reason or other, be separated from the glycerin.

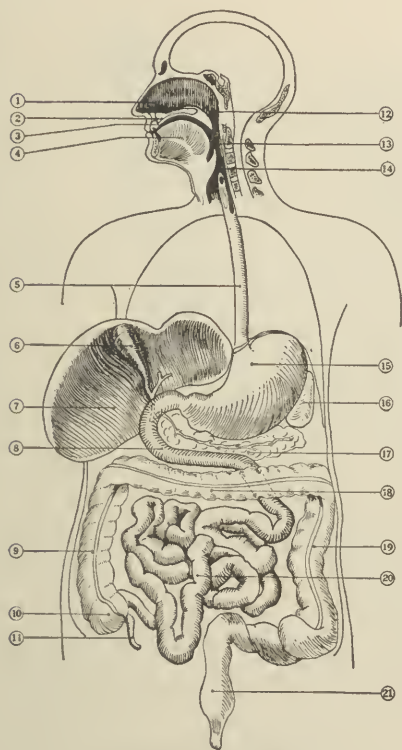
Most of our food is incased in more or less non-digestible capsules, and bound about by non-digestible fibers. We call this material from plants cellulose, and from animals connective tissue. Cows and horses can get along very nicely on cellulose, for they are prepared to digest it; but man is not provided with the right kind of apparatus to attend to it properly, and consequently it is largely nonnutritive to him. His digestive tract is therefore required to free the digestible from the non-digestible, and to pass the latter along as waste.

MASTICATION

The entrance of food into the mouth is a signal for the work of mastication to begin. This effort is more or less involuntary; that is, we do not have to stop and concentrate on the matter of chewing, unless, as disciples of Fletcher, we deliberately plan to take the joy out of eating by timing every mouthful. We should train ourselves to chew each mouthful until it has been reduced

to a satisfactory degree of fineness. This accomplished, the nervous system will relieve us of police duty, and we can enjoy the relaxation that the meal hour should afford. There are tiny specialized nerve endings scattered here and there on the inside of the cheeks, and on the tongue and the gums, whose specific duty it is to keep us chewing until the food is reduced to a suitable degree of fineness. We can ourselves set the gauge. If we have trained these nerve endings, by careless haste in our eating, to stop when our food is still in fair-sized chunks, we need to begin a little discipline.

Mastication is important from the mechanical as well as the chemical standpoint. Only after we have broken the food down by chewing is the real flavor liberated. This is an essential factor in stimulating the glands of the stomach and other organs for the duties soon to devolve upon them. The so-called psychic stimulation from the presence of food in the mouth aids in toning up the whole digestive system.



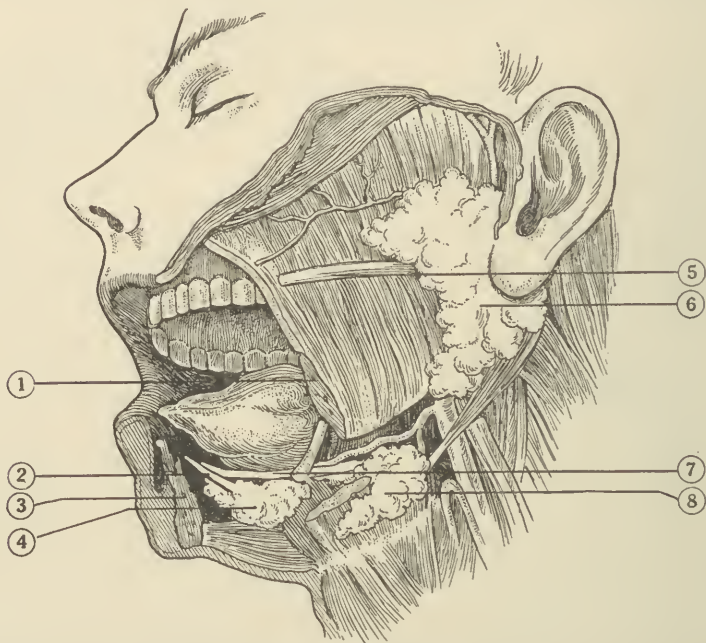
From Morris's "Human Anatomy"

THE ALIMENTARY CANAL

- | | |
|--------------------|------------------------|
| 1. Nasal Cavity | 11. Vermiform Appendix |
| 2. Palate | 12. Nasal Pharynx |
| 3. Mouth Cavity | 13. Oral Pharynx |
| 4. Tongue | 14. Laryngeal Pharynx |
| 5. Esophagus | 15. Stomach |
| 6. Gall Bladder | 16. Spleen |
| 7. Liver | 17. Pancreas |
| 8. Duodenum | 18. Transverse Colon |
| 9. Ascending Colon | 19. Descending Colon |
| 10. Cæcum | 20. Small Intestine |
| | 21. Rectum |

SALIVARY DIGESTION

There is a secretion poured out by the salivary glands into the mouth in response to the presence of food. It contains chemical substances (ptyalin and maltase) capable of changing starch and sugar to the simplest forms of carbohydrates. Attention has already been called to this alteration. Most of us do



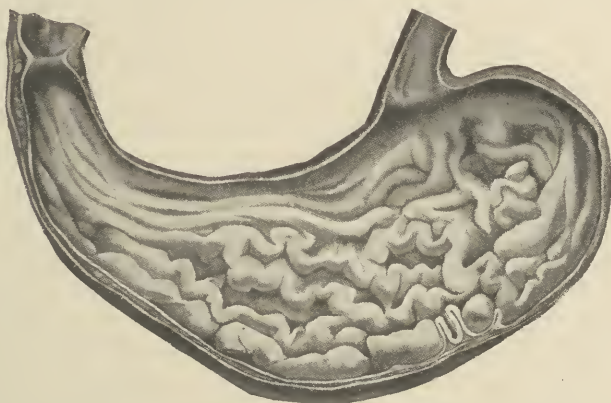
Dissection of head, showing the three salivary glands of one side, with their ducts for discharging saliva into the mouth

- | | |
|--|---|
| 1. Bone of the lower jaw, which has been cut away | 5. Duct of the parotid gland, opening through the cheek, opposite to the upper second molar tooth |
| 2. Duct of the sublingual gland, opening in the floor of the mouth, under the tongue | 6. Parotid gland |
| 3. Bone of the lower jaw | 7. Duct of submaxillary gland, opening in the floor of the mouth, just under the tongue |
| 4. Sublingual gland | 8. Submaxillary gland |

not allow food to remain in the mouth long enough to finish this process, so most of the salivary digestion of carbohydrates goes on in the stomach for forty minutes or so after the food has entered.

This juice has no action upon proteins or fats. It merely serves as a lubricant and dilutant, in order that these other substances can be handled more easily mechanically.

As the masticated food is crowded toward the back of the mouth, it touches certain nerve endings that cause us to stop chewing and to swallow. In swallowing, we again leave the details to the nervous system, and usually this very complex process is accomplished without a hitch. All respiratory openings are closed, so that the food will not be forced out of the nose or down the windpipe. With the mouth closed, the tongue acts like a piston, and throws the bolus of masticated food back



Deep constrictions appear on the stomach wall in its lower half, and travel toward the opening into the duodenum.

into the beginning of the esophagus. The circular muscle of the esophagus then begins to contract behind it, and this constriction wave carries it down the tube and into the stomach.

THE STOMACH

The chief function of the stomach is to serve as a reservoir for food. As fast as the intestinal tract can deal with the food, it is passed on. True, the stomach pours out a juice containing chemical substances that will help in the chemistry of digestion, but they are not indispensable. Physicians often accidentally discover patients who have no gastric juice to speak of, yet who have no complaint on that score. Digestive juices in the intestine will care for the food. The fact is that digestion as a whole suffers very little from disturbance in secretion. There is a very large factor of safety there, and the feeding of digestive enzymes¹ as medicinal agents is without good scientific reason. If one digestive juice fails, another a little further along assumes the

¹ Enzymes — materials in digestive juices which act as agents in digestion — digestive ferments.

responsibility. The trouble is usually with the motor activities of the tract; that is, the movement of the food down the tract.

The stomach is so constructed that it can accommodate itself to varying quantities of undigested material, always making firm pressure on its contents. Thus, unlike a flabby bag, it stratifies its contents as they enter, and they maintain their same relative position until the organ is emptied. Deep constrictions appear on the stomach wall in its lower half, and travel toward the opening into the duodenum. This opening, called the pylorus, is guarded by a strong circular band of muscle whose function is to prevent a too rapid emptying of the stomach. It is the pressure from within produced by these strong peristaltic waves passing down the stomach, that is effectual in forcing this pyloric sphincter and passing food material on into the duodenum. If the material is irritating—that is, too coarse and rough, or too strongly acid, or too peppery—it irritates the lining membrane of the duodenum. This acts as a stimulus to hold the pylorus more tightly closed, and thus the emptying of the stomach is abnormally delayed, and we suffer from it.

As the organ empties, the waves originate higher and higher on the wall, until finally they are seen to begin close to the place where the esophagus opens into the stomach. Then it is that we experience those disagreeable sensations which we interpret as hunger. This feeling of emptiness, pain, or actual nausea, is caused by these muscular contractions pinching the nerves of sensation in the uppermost part of the stomach.

We have four important elements in the stomach juice: hydrochloric acid, pepsin, rennin, and gastric lipase. The hydrochloric acid and the pepsin begin the breaking down of proteins; rennin turns milk into curds, favoring its retention in the stomach, where these may act upon its protein; the lipase splits up some of the fats so that they may be absorbed.

THE LIVER

When the material from the stomach is ejected into the duodenum, it immediately acts as a stimulus for the secretion of juices from both the liver and the pancreas. The liver, a great factory and de-toxicating works, located under the edge of the ribs on the right side, manufactures bile, which is stored in the gall bladder just under the ninth rib. During digestion, it first empties this storehouse, and then supplies more, directly from its manufacturing source, pouring it into the duodenum by way of the bile duct. Bile is very effective in helping out in the breaking down and absorption of fats, and assists in a small way in the digestion of proteins and carbohydrates.

THE PANCREAS

The pancreas forms a narrow band of tissue, the head of which lies in the curve of the duodenum on the right side, and extends across the abdomen to the left behind the stomach. Its digestive secretions are poured into the duodenum through a passage called the pancreatic duct. It furnishes three important digestants: trypsin, which acts on proteins, and which is capable of either digesting them from their primary state, or furthering the work of the hydrochloric acid and pepsin of the stomach; steapsin, for fats; and amylpsin, which converts starch into dextrose.

THE INTESTINE

As we go down the twenty-five feet of intestine, we find other secretions added from glands present in the wall of the passage: erepsin, to complete protein digestion; invertase, to convert cane sugar into a simple, absorbable sugar; lactase, which does the same for milk sugar; maltase, which changes maltose to dextrose. Thus we see that there is an abundance of means provided to digest the food we eat.

The material from the stomach is passed down the small intestine by degrees through the action of peristaltic waves; that is, a ring of muscle of the intestine contracts, and this constricting ring follows right down the canal. Obviously everything in front of it has to move. A given segment of food is vigorously churned by a sort of rhythmic contraction and relaxation of the intestine for a few minutes, and then a wave appears and carries it down the track from one to three inches, and shortly the churning action is again seen. This particular type of activity is very effective in mixing the digestive juices with the food, and also assists in the absorption of prepared material. Thus it travels throughout the length of the small intestine — fourteen inches of duodenum, nine feet of jejunum, and fourteen feet of ileum. Six to nine hours after its ingestion, the fluid remainder, containing the residue and some yet unabsorbed nourishment, passes through another sphincter, the ileocæcal, which guards the entrance into the large bowel.

THE CÆCUM

In the first portion of the large bowel, we find that most of the waves pass toward the stomach. This is for the purpose of vigorous mixing in the cæcum and to facilitate absorption. The cæcum, by the way, is a sort of closed pouch about two and a half inches deep. It forms the first part of the large bowel, and is situated away down in the lower right-hand corner of the

body. The appendix buds off from this pouch, so most of us know just where to locate it.

The ileocecal valve guards the entrance to the cæcum, and prevents the passage of fluid back into the small bowel during normal digestion. Every so often a peristaltic wave appears at the cæcum and carries a portion of the material found in the cæcum and in the ascending colon up and into the transverse colon. Gradually this material assumes the appearance of feces, and is from there slowly moved along the remainder of the colon to the rectum.

No digestive juices are secreted in the large bowel. Nothing is added but a little mucus for lubricating purposes. When the rectum fills, it stimulates nerve endings that tell us of the necessity for emptying the bowel. This call frequently comes immediately after a meal, and is due to a stimulation of the entire tract by the entrance of food into the duodenum. When we fail to answer the call, the signal ultimately ceases to warn, and we tread the path of the chronically constipated.

ABSORPTION OF FOOD

All down the tract, the food as it is prepared by the digestants is absorbed. A network of blood vessels incases the lining membrane of the intestine; and through the operation of vital cellular activity—which, by the way, is the scientific term for this manifestation of the power of the Creator—and the utilization of physical forces, the simplified protein (amino acid) and the simplest carbohydrates are taken directly into the blood system. The blood passing through all this great capillary area is united to enter the liver through the portal vein. Here a large part of the dextrose is stored as glycogen, and drafts are made on the supply as needed for bodily activity. The proteins are distributed directly to the cells of the body, each cell withdrawing just what it requires in its work of repair and growth. The fats are taken into that great drainage canal of the body, the lymphatic system, and through this channel forwarded to the blood.

From the descending colon and the rectum there is some absorption. A person who is constipated may absorb a certain amount of poison from putrefying fecal material retained in the rectum. This, however, is negligible. He ascribes his headache and general sense of unfitness entirely to auto-intoxication. This is their source in part only, if at all. The ill effects of constipation result not so much from poisons absorbed, as from a mechanical irritation of the colon caused by the accumulation of fecal masses. This is shown by the fact that relief, either partial or complete, immediately follows evacuation in most cases.

THE INFLUENCE OF THE NERVOUS SYSTEM

The stomach and the intestine, although supplied with nerves, are not dependent upon the nervous system for their activity. The nervous system influences this activity, but its responsibility ends there. The muscle of the entire tract is automatic. That is, it is independently irritable, and possesses those character-

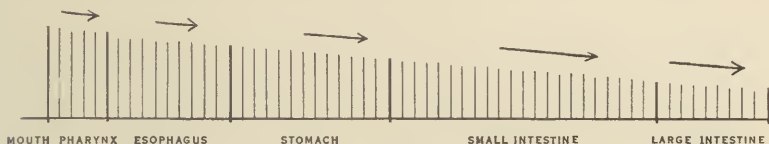
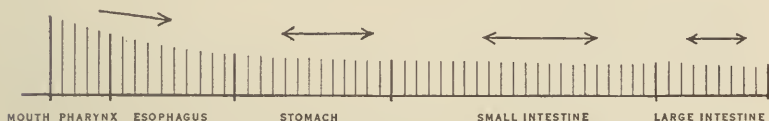


Diagram showing the normal gradient of muscle irritability and activity in the digestive tract



Abnormal gradient, as in constipation, with little forward movement in the stomach and the bowels



Abnormal gradient, vomiting being caused by greater muscular irritability and activity in the stomach than in the esophagus

istics which enable it to respond to stimuli in a way that will benefit the organism. A very interesting fact relative to this muscle is that from above downward the irritability decreases. As we approach the colon, the response to stimuli is slower and the movements are much more sluggish. In other words, there is a definite gradient of activity, and this is the reason why our food normally travels in the one direction — downward. Sometimes the lower end of the bowel becomes just as irritable as the upper end; and when it does, the onward progress of food is arrested. Again, it may become even more irritable, and peristaltic waves pass up instead of down, and we suffer a variety of symptoms, from loss of appetite to nausea and vomiting.

Irritants outside of the bowel, in the form of chronic appendicitis, chronic inflammation of the gall bladder, pelvic irritations and congestions, may level the gradient, thus slowing up the onward passage of material; or they may even reverse it, and produce symptoms of backward movement. A constipated colon is a great source of the same trouble. The sluggish lower bowel becomes more irritable than nature intended it to be, and under these conditions, sends off ripples that tend to neutralize the efforts to normal movement that emanate from above. A coated tongue is nothing more than mute evidence of waves, perhaps mere ripples, that have passed up instead of down, carrying with them particles of material through the stomach, possibly from the bowel. It seems that the more highly tuned the tissue, the more susceptible it is to toxic influences. Hence the apparent ease with which some harmful ingested substances, or poisons from disease, may flatten or reverse the peristaltic gradient and derange the system generally.

Although the tract is capable of functioning without outside help, yet the influence of the nervous system is not to be minimized. Every segment of the gastrointestinal tract is surrounded by a network of nerves, and every digestive gland is permeated by nerve cells and fibers. The brain is thus in touch with every portion of the digestive system, and that system is in constant communication with the brain. One part of the tract is always in touch with every other part. When anything goes wrong in one place, it is very likely to be felt all along the line. It is because of this intimate connection of all parts, that the emotions play such an important rôle for weal or woe in the care of our food. Worry, fear, anger, and anxiety exercise a depressing influence over both motor and secretory activity; while one who maintains a happy frame of mind is supplying a tonic to the organs of digestion. It must be added, however, that although marked depression may be seen in gastrointestinal activity as a result of a transitory upset of mental poise, there is no scientific reason for the belief that the system may become chronically impaired through these nervous influences.

Diseases of Mouth and Esophagus

The mouth is an important cavity, and one which is neglected by many people; and some people give it no attention or care whatever, unless there is a condition in it that is actually causing pain.

Exposure of the teeth and the mucous membranes of the mouth to extremes of temperature is very harmful. Hot drinks should not be taken at extreme temperatures, and should be sipped slowly. Ice cream and iced drinks also should be taken slowly, giving the mouth plenty of time to warm them. Otherwise congestions are caused in mucous membranes as well as in the salivary glands.

After eating, one should cleanse the mouth from all food particles by rinsing, and by the use of dental floss to remove particles from between the teeth. After this is done, the teeth should be brushed thoroughly with some good dentifrice. This process should be repeated upon arising and after each meal.

In the selection of a toothbrush, one with medium stiff bristles rather than the very hardest should be chosen, else unnecessary damage may be done to the gums, and even the teeth may be abraded and seriously injured. The movements employed in the use of the brush should also have attention. Horizontal or side-to-side movements over the front teeth, particularly the upper front teeth, with a hard brush, may injure the enamel, or completely penetrate it. An up-and-down motion, especially for the front teeth, is safer and more effective.

COLD SORE OR FEVER BLISTER (HERPES LABIALIS)

This is an eruption on the red border of the lips. It consists of little vesicles, which contain a fluid. The eruption is preceded by a tingling and burning sensation. The little vesicles become confluent—that is, run together—and usually break later. It is from three to ten days from the time they begin until they are healed. They are a great annoyance and very uncomfortable.

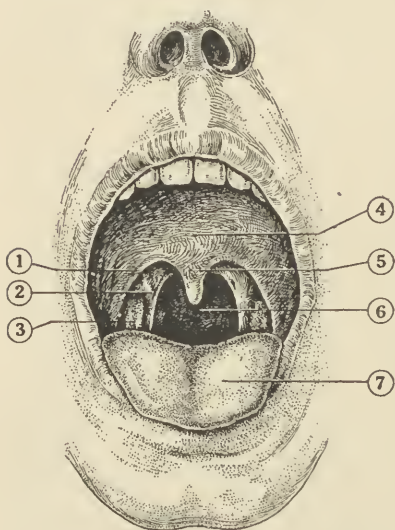
They accompany many febrile diseases, especially pneumonia, and are often present in digestive disorders.

Treatment: If they are a feature of a febrile disease, their treatment consists in the regular treatment of that disease. The same is true of digestive disorders. Locally, the treatment consists in not breaking the little blisters, keeping the tongue off the site of trouble, and making an application of some astringent,

one of the best being camphor. Usually a simple cathartic and a change to a very light diet, excluding fruit for one or two days, will greatly benefit this condition.

INFLAMMATION OF THE MOUTH (STOMATITIS)

Causes: Decaying teeth, want of cleanliness, mouth-breathing and the use of pacifiers by babies, the eating of too hot or too cold foods, or the use of mercury, iodine, antimony, or arsenic as medicines, may all cause this difficulty, especially in those who are in a generally weakened condition. This disease is frequently a complication of many gastric and intestinal ailments. Some of the acute febrile diseases are also complicated with it, typhoid fever, measles, and scarlet fever particularly.



THE MOUTH AND THE THROAT

1. Anterior Pillar of Fauces
2. Posterior Pillar of Fauces
3. Tonsil
4. Soft Palate
5. Uvula
6. Back Wall of Throat
7. Tongue

Symptoms: There is redness, heat, and swelling, sometimes so much as to give the cheeks a puffed-out appearance. The saliva is greatly increased in quantity, is more viscid, and the breath has a miserable, fetid odor, which is overwhelming. There is rise of temperature, and considerable prostration.

Treatment: All irritants must be avoided. The mouth should be rinsed every thirty minutes with a warm three per cent solution of boric acid. Hot fomentations should be given every three hours over

the entire face. Alternate hot and cold to the spine and hot foot baths should also be worked into the treatment. The patient should be put to bed, kept on a liquid diet, and fed at frequent intervals. In the case of children and infants, no milk should be given without having lime water added.

THRUSH

This disease of the mouth is a fungus growth that appears on the tongue, the roof of the mouth, and the inside of the cheeks

and lips, in the form of white patches like pieces of curdled milk. Many mothers do not notice it at first, because it looks so like curdled milk. There is an inflamed base, and the white spot is on this base. Thorough inspection will show the back of the tongue and part of the cheek with these white particles adhering. The child manifests less desire to nurse, often refusing the breast or bottle. The mouth is hot, and the lips are hot and feverish.

Treatment: This must be thorough and continuous. The mouth must be washed every two hours with a saturated solution of boric acid. (See chapter 12.) Put a piece of absorbent cotton over the end of the finger, dip into a small portion of the boric acid solution, then wash part of the mouth. Each time the finger is dipped into the boric acid, a clean piece of cotton should be used, to prevent reinfection. Thrush will never occur if care is used with the breasts after nursing. They should always be washed with boric acid solution before and after nursing. Rubber nipples from bottles should be washed and boiled, a clean nipple always being taken when nursing time comes. "Prevention," in this case, "is worth a pound of cure." Never use nursing bottles with rubber tubes for connection with a nipple. They cannot be kept clean and sterile.

GANGRENOUS SORE MOUTH (NOMA)

This disease also is a stomatitis, but it is such a virulent infection that destructive gangrene rapidly sets in, frequently causing perforation of the cheeks, and, if the patient recovers, great disfigurement. Its mortality is high. It usually occurs as a complication in some malignant form of measles, whooping cough, malaria, and so forth. It is not common.

Treatment: This is the same as that for any other stomatitis.

ACUTE INFLAMMATION OF THE TONGUE (GLOSSITIS)

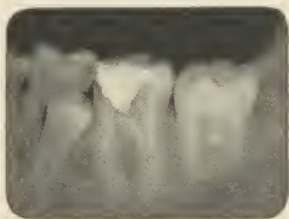
Causes: This may result from any of the causes given for stomatitis, or inflammation of the mouth; also from injuries to the tongue, such as biting it while eating or when in an epileptic fit. It may result, too, from the sting of an insect, or it may be a complication of some of the serious systemic diseases,—tuberculosis, typhoid fever, scarlet fever, erysipelas, or smallpox. Alcohol and tobacco rank high in the list of causes of this trouble.

Symptoms: The tongue becomes stiff and thickened. There is difficulty in controlling the food in the mouth, and in swallowing. The patient speaks thickly. There is also pain on motion.

Treatment: This condition should be prevented by proper care of the mouth. Fomentations to the upper throat and underneath the chin should be given. There must be liquid diet, and if the case is severe, absolute rest in bed.

MALOCCLUSION

This is the improper closure of the upper teeth upon the lower. Frequently the permanent set of teeth "come in crooked," because the arch of the jaw is not large enough to accommodate the teeth edge to edge. Thus the teeth do not come together properly in the "bite." Sometimes this results in deformity of the face, and is in many ways injurious to the child. When the condition is so bad as to need treatment, the child should be taken to an orthodontist—a dentist skilled in correcting irregularities of the teeth—where he can receive scientific care. All cases can be corrected. It takes about a year of right management to put the teeth once more in line. This is an important matter, and should not be neglected.



An Impacted Molar

IMPACTION

It sometimes happens, especially with teeth that are late in erupting, as the wisdom teeth, that they become "impacted." They may be wedged between other teeth, so as to be unable to erupt; or in some instances, they become entirely incased in the jawbone, because of the position of the teeth surrounding them. Teeth thus impacted are a great source of irritation. They are productive of nervousness, indigestion, fermentation of the food, constipation, and many other disorders. These cases should be taken to a competent dental surgeon.

DECAY OF TEETH (CARIES)

Thorough cleansing of the mouth and the teeth is an essential factor in preventing decay. Diet also is recognized as having an influence in this direction. The teeth of children and older persons alike are injured by the free use of candies and sweets, particularly when these are eaten between meals.

Treatment: Have the cavities filled by a good dentist as soon as they are discovered. And the teeth should be carefully watched for cavities, at all ages.

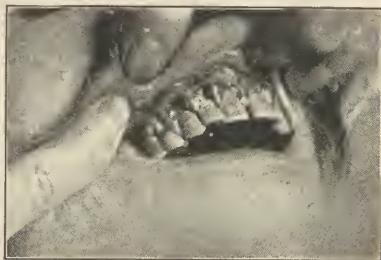
Cavities in the baby teeth should have attention as well as those of the permanent teeth, since the loss of the baby teeth by decay may seriously deform the jaws and interfere with the normal eruption of the permanent set of teeth. Especial attention should be given to the so-called "six-year molars." These are permanent teeth that are frequently mistaken as belonging to the baby set, and decay in them is neglected, and thus they

are often pulled out on account of cavities. Their loss in childhood is most unfortunate, as it results in great deformity of the jaws and irregular alignment of the other teeth.

When the teeth become so badly decayed that the tooth pulp, or "nerve," is involved, then this "nerve" must be killed before the tooth can be filled, and such a tooth becomes a "dead" or "devitalized" tooth. Some dentists and other authorities take the extreme position that no dead tooth should be retained in the mouth. Many do not go as far as this. Unquestionably such teeth are a menace. (See chapter 76.)

PYORRHEA

This is a malady that is rapidly becoming general. It is a condition affecting the gums around the teeth, but is productive of many ailments in other parts of the body. (See chapter 76.)



Pyorrhea

NARROWING (STENOSIS) OF THE ESOPHAGUS

Causes: This condition may be produced by tumors within the tube or pressing upon it, as cancer or sarcoma; or by contracting scars resulting from drinking caustic acids, alkalies, or other corrosive substances. It is frequently caused by attempts at suicide, and mistaken identities in bottles when taking medicines; and in little children, by swallowing lye. It may be caused also by the scar tissue in healing ulcers resulting from typhoid fever, or a typical peptic ulcer at the lower end of the esophagus.

Symptoms: There is usually an increasing sense of fullness under the breastbone when the patient attempts to swallow. He is compelled to eat slowly; and as the condition gets worse, there is a regurgitation of the food. There is seldom any nausea. There may or may not be pain. Sometimes the malady progresses so far that only hot liquids can be swallowed. In these advanced cases, there is emaciation and weakness, with loss of weight. That is, the patient starves.

Treatment: If the difficulty arises because of tumors, the treatment is identical with the treatment of the tumor. Cancer of the esophagus is not uncommon. Oftentimes a cancer can be kept from closing the esophagus entirely, by the introduction of bougies—long, flexible tubes—by the physician, which keep it open. However, if the tumor continues to shut off the pas-

sageway and cannot be removed by surgery, the only means of keeping the patient comfortable and enabling him to be nourished is to perform an operation called gastrostomy, or, in plain words, to make a permanent opening into the stomach through the abdominal wall, through which artificial opening the patient can be nourished.

Cancer of the esophagus can be greatly retarded and relieved by the use of both X ray and radium. Science is rapidly advancing in this particular line, and these sufferers are having much more help than was possible five or ten years in the past. Exposure to X ray or radium will reduce the size of the tumor and greatly retard its growth.

If the narrowing is due to contracting scar tissue, the esophagus has to be kept open by stretching the scar with olive-pointed bougies, which are introduced in slightly increasing sizes. This will often afford the patient great relief, and enable him to swallow sufficient food to keep up his nourishment. The passing of such instruments can be done only by highly skilled persons who have had experience in the management of these cases. Otherwise their use is fraught with grave danger.

SPASM OF THE ESOPHAGUS

This is a condition in which there is spasm of the muscles, which in severe cases remain constantly contracted, and permit of the passage of food only with difficulty, if at all. It most commonly occurs at the lower end of the esophagus, where food empties into the stomach. At this point, there is a sphincter muscle, called the cardiac sphincter, because it is at the end of the stomach near the heart.

Causes: This condition usually arises in very nervous, high-strung individuals. The phlegmatic type of person is seldom afflicted thus. It is a common sequel or complication of such spasmodic diseases as whooping cough and epilepsy, and also of many of the other acute febrile diseases, as scarlet fever, diphtheria, and measles. It sometimes also follows injuries.

Symptoms: The symptoms of this malady are much the same as those of stenosis. The patient is nervous. He regurgitates his food unmixed with the acid gastric juice. The mucus returning with it is ropy and glary. He finds at times that hot liquids will enter the stomach when nothing else will. When food can be taken at all, it is retarded at the opening into the stomach. The patient is conscious of this condition if the food is taken a little cold or hot; and after swallowing, he can feel the food finally drop through into the stomach. There is ina-

bility to swallow successfully the coarse foods, as raw apple, cabbage, carrots, and spinach.

As the severity of the case increases, there is loss of weight from lack of nutrition. The patient frequently grows discouraged and despondent.

Treatment: This condition demands relief from the strain of work and worry. Frequent change of scene also often has a very decided influence for good.

Hydrotherapy is beneficial to a marked degree. Before eating, the patient should have a hot foot bath, with fomentations either over the stomach and the lower chest, or to the spine. Sometimes alternate hot and cold to the spine will benefit more than straight fomentations. A neutral tub bath for forty-five minutes or an hour will also greatly assist in relaxing the spasm. (See chapter 10.)

The most important factor in the treatment of this ailment is the stretching of the sphincter muscle that guards the opening of the esophagus into the stomach. This requires the services of a physician skilled in the use of the instruments needed. Olive-pointed bougies are first passed, until the physician is thoroughly acquainted with the degree of resistance and of tendency to spasms. After this, a special instrument consisting of a little collapsible bag is passed until it enters the sphincter. The bag is then dilated either with air or with water pressure, thus stretching the muscle thoroughly. The size to which it is stretched is determined by the size of the bag used. Following this stretching, the patient eats with comfort and enjoys relief. Repeated stretchings may be necessary—in some instances, as long as the patient lives. In a goodly number of cases, however, there is full recovery.

DIVERTICULA

The esophagus is narrowest at three points; namely, very close to its upper end, at the point where it crosses the left bronchus, and at the point where it passes through the diaphragm. At these three points, trouble oftenest occurs. Food sometimes lodges here, and by constant accumulation, causes a sacculation, or diverticulum—that is, a blind pouch or sac. As the pouch increases in size, food collects in it, causing fetid odor, with pain and vomiting.

Pouches may also be caused by inflammation in lymph glands and other tissue surrounding the esophagus. After these inflammations subside, the contracting scar tissue adheres to the walls of the esophagus and pulls them out, thus causing sacculation.

Diagnosis: This condition is determined best by the use of the X ray. Bismuth taken into the esophagus will fill the sac, giving a definite outline that will show its position and size. Its depth can also be measured by the use of bougies.

Treatment: Relief is obtained by an operation to remove the sac, provided the sac is so situated that it can be reached. When it cannot be reached, treatment consists in keeping it washed out by lavage, and sometimes by having the patient swallow while lying in such a position as will best tend to prevent food from entering the sac.

FOREIGN BODIES IN THE ESOPHAGUS

Accidents of this kind occur most frequently in children, but may happen to adults. Coins, beads, marbles, buttons, fruit pits, false teeth, pieces of bone, pins, *et cetera*, are often swallowed. To say the least, this is dangerous; but the frequency with which such objects are successfully passed, is surprising.

Treatment: Whenever a foreign body is swallowed, the greatest vigilance should be exercised to recover it. The stools should be placed upon a screen with fine enough mesh to screen out the article you wish to find. They should then be put under a gentle stream of water and slowly worked through the screen. In this manner, the foreign body will not be overlooked.

If the search is still unsuccessful after forty-eight hours, the object should then be located with the X ray, and the patient should be under the observation of a surgeon until it is passed with the stools or removed by surgical or other artificial means. If it has a sharp point or edge, great care should be exercised to assist nature in handling it. A dry diet should be taken, and one which is bulky, including crackers, mashed potatoes, various vegetables, or any coarse foods. This diet keeps the intestines distended and helps to form a buffer for the protection of the walls of the tract.

ULCERS

These may form in the esophagus as a result of the swallowing of irritating materials, or foreign bodies with sharp edges. Or they may form as a result of the irritation of the lining membrane by food retained above the three points of constriction in the esophagus. (See paragraphs on Diverticula.) If these ulcers are not properly treated, they may cause pouches or distention of the walls of the esophagus.

CHAPTER 28

Diseases of the Stomach

INDIGESTION

“Indigestion” is a very indefinite term. It is one applied by patients to almost any symptom or group of symptoms arising from deranged conditions in the stomach or the bowels. To say that you have indigestion, is like saying you live in the United States. You might live in Maine, or you might live in Southern California, and yet be stating the truth; so in stomach disorders, indigestion may be simple indigestion, an ulcer, or cancer,—widely separated maladies. It is therefore necessary to make a close study of these diseases, and get our difficulties well classified, before they can be intelligently treated. On this account, if you have a serious ailment, do not seek your advice from medical books, magazines, and lectures, but consult a competent physician, that you may have a personal diagnosis, and have treatment prescribed that will fit your individual case. We shall attempt in this chapter to give only such advice as will benefit any case and harm none.

FERMENTATION

Fermentation of food in the stomach and the bowels is a great evil, and many suffer from it through a lack of practical understanding of some of the simple laws of health.

Symptoms: Fermentation and its resulting irritation cause many different symptoms. We will mention a few of them. Gas is one of the leading and most prominent symptoms. It is belched from the stomach, momentarily giving relief from gastric distress. It gurgles and rumbles in the bowels, causing distention, and adding to the distress. Fermentation sometimes becomes so strong that it causes diarrhea. In this case, the stools are at first broken up into segments, later becoming liquid and foamy. There is a general abdominal distress and pain. There is also headache and mental dullness. The patient is unable to concentrate his thoughts or do constructive thinking.

Causes: Given any organic matter with heat and moisture, fermentation will result. These conditions always exist in the stomach and the bowels; but we are saved constant fermentation by the presence of the digestive juices, which preserve the food in normal condition while it is carried through the successive stages of digestion. Anything that destroys the efficiency of these digestive juices is a cause of fermentation. Too much

water-drinking at meals, overeating, rapid eating, nervousness, overwork, loss of sleep, use of tea, coffee, condiments, mustard, and pepper, eating between meals, eating of spoiled foods and unripe fruits, are all common causes.

Treatment: There are always certain germs present where fermentation exists; and before it can end, the place must be cleansed from them. It is therefore necessary to empty the tract thoroughly. If the diarrhea becomes severe, nature herself accomplishes the emptying. A fresh start should then be made very carefully, with such foods as boiled milk and well toasted bread, rice, or some light cereal. If the condition is bad, boiled milk alone should be used until relief is obtained, other foods being gradually added. The taking of buttermilk or yogurt is also good treatment for fermentation.

Another good treatment for mild fermentation is the "fruit day." For this, the patient should choose a day when he can be relatively quiet. Fruit should be eaten once every hour. Any kind of fruit may be taken, either cooked or raw. This stimulates all secretions and excretions. It sweetens up the entire intestinal tract; and the next day, a new beginning can be made with the regular diet. This is a real "blood purifier," one hundred per cent efficient; and no purveyor of drugs and nostrums can sell you its equal in a bottle, be the price or testimonials what they may. If you have a marked *hyperacidity*, this fruit day will not fit your case well. Hence, if you find that it makes you feel bad, do not repeat it, but consult a good physician. It can be used by some people as often as once a week to advantage.

SOUR STOMACH, OR HEARTBURN (HYPERACIDITY)

This is a condition in which the secretory glands have been stimulated to oversecretion, and the resulting digestive juice is too concentrated and irritating.

Causes: Overwork, worry, overstimulating foods, spirituous liquors, smoking and chewing tobacco, condiments, eating between meals, eating food too hot or too cold, loss of sleep, excessive amounts of sugar or starchy foods, improperly cooked food, poorly baked bread, and soft drinks are prominent causes. Any reflex irritation from elsewhere in the body, as constipation, bad teeth, pyorrhea, appendicitis, gallstones, or inflammation of the gall bladder, may be causes. Many times, however, this condition exists without any known cause.

Symptoms: Extreme nervousness, inability to sleep, burning in the stomach and throat (water brash), excessive appetite, and belching of gas are leading symptoms. The belching of gas is

sometimes constant. The upper abdomen has a sense of distress. There is usually some relief in taking soda, and also immediately after eating food; but this relief does not last long.

Treatment: If the causes are reflex from irritation elsewhere, as constipation, appendicitis, gall bladder trouble, or poor teeth, a dependable physician should be consulted. There are many cases, however, in which no reflex cause can be found; and all cases should receive dietetic attention. These cases especially have to depend largely upon it.

Diet: Fruit in general should be avoided. If any is taken, it should be only the mildest, as figs, dates, prunes, or pears. The patient should endeavor to eat rather freely of fats and oils, since these are very soothing to the stomach, and have a tendency to lessen the secretion of acid. They also retard the emptying of the stomach, and hold the food for a more thorough digestion, and take up the acid secretion. Milk, cream, olive oil, nuts, *et cetera*, are the best sources of fats and oils for this purpose. Cases of this character also need to drink more water than a normal person. The water is needed to dilute the gastric juice, which is too concentrated. These cases, contrary to the general rule, should drink freely at mealtime as well as between meals, of pure water.

ABSENCE OF ACID (ACHYLIA)

In this condition, the hydrochloric acid tends to disappear from the gastric secretion. Just as abuses and reflex irritation will cause an oversecretion in hyperacidity, so they will in this condition tend to produce an absence of acid and a weakened secretion which is ineffectual in its work. In this trouble, the sphincter or circular muscle guarding the outlet of the stomach loses its "cunning" and intelligence in selecting foods to pass; and as a result, everything goes running rapidly past it into the duodenum, whether it is prepared or not, and in extreme cases, diarrhea is the result.

Symptoms: Heavily furred tongue, no appetite, heaviness and distress after eating, abdominal distress, with sometimes pain in the stomach when food is present. There is a marked relief when the stomach is empty. This is in contradistinction to the relief that comes upon taking food in hyperacidity. There is headache and a sleepy, drowsy condition after eating, which usually lasts until the stomach is empty. These patients usually have a bad breath.

Treatment: In this condition also, the physician hunts for some reflex cause to remove. Outside of this, the treatment con-

sists in building the patient up as much as possible, with tonic hydrotherapy treatments and close attention to diet. These patients always do well by taking dilute hydrochloric acid. Ten minims should be taken in water fifteen minutes before eating, and again one hour after eating. This is simply supplying one of the natural ingredients that the stomach is unable to supply. It also enables the enzymes, digestive ferments, to be active, since they require the presence of acid to work properly.

The diet should be bulky. All the coarse vegetables should be used freely. Fruits and cereals are both very acceptable in this condition. Fats, however, have to be taken very sparingly.

This absence of hydrochloric acid is many times the forerunner of another disease, called pernicious anæmia. On this account, if no other, when the patient discovers that his condition is one of low acid or none at all, he should at once seek professional advice. The reader is here referred to the chapter on "Diseases of the Blood" (chapter 35 of this volume), where he will find an interesting discussion of pernicious anæmia.

GASTRALGIA

At times, the stomach will rebel at the bad treatment given it. As a result of long continued abuses, and sometimes as a result of one exceptionally vicious insult, when the patient is not in vigorous health, the inflammation in the walls of the stomach will suddenly become so severe that they will be thrown into a state of spasm, which is painful in the extreme. This may be so violent that the stomach can be felt like a croquet ball in the upper abdomen as it is drawn up in spasm.

Treatment consists of hot fomentations, hot foot baths, hot drinks, rest in bed, hot saline enemas. If these fail to relieve, it is many times necessary to call a physician before relief is obtained.

ULCER

This condition is more common than is generally thought, the patient often failing to recognize it, or to apply for relief, thinking it is only indigestion, and that nothing could be done.

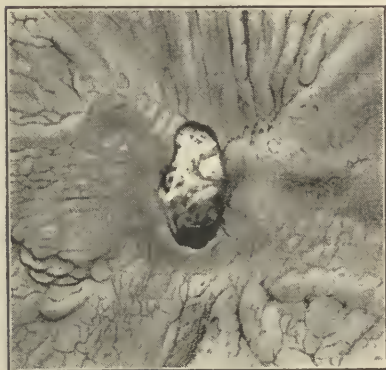
Causes: Ulcer seems to be produced by the gastric juice digesting away a small part of the mucous membrane that has been injured in some way, or had its nutrition impaired by something happening to the little blood vessel that supplies that particular area. The cause of ulcer has long been a point of much divergence of views among physicians and surgeons. It is most commonly found in those suffering of hyperacidity. Therefore the

causes of hyperacidity are thought to be also causes of ulcer. However, ulcer may be found in stomachs that are low in acid secretion.

Symptoms: There is pain in the stomach and a very definite point of tenderness. The pain is usually a very characteristic one. It is a real pain, burning or boring in character. It is relieved by eating, especially of fat or oily foods. It is also relieved by taking an alkali, as bicarbonate of soda (common baking soda). It returns, however, as soon as the height of digestion is reached, or at least by the time the stomach is again empty,

because at this time the secretions are very concentrated and at a maximum strength, and when the food is gone, there is nothing to take up the digestive juice, and it is free once more to irritate the ulcer.

Hemorrhage: In severe cases, the ulcer may erode so deeply as to eat into a small blood vessel and cause hemorrhage. This may be slight, and be detected only on chemical examination of the stools by the doctor; or it may be excessive, causing the vomiting of large quantities of blood, and diarrhea, with



An ulcer in the wall of the stomach, as seen from the inside of the stomach

black, tarry-looking stools. This hemorrhage may even prove fatal.

Vomiting: Often the stomach becomes so irritable that it ejects food by vomiting nearly as soon as the food is swallowed. Sometimes the ulcer is so close to the pylorus, or outlet sphincter muscle, that it keeps this sphincter in a constant state of irritation. It will then remain locked, and the stomach cannot empty itself. In such instances, vomiting persists until care and treatment bring relief.

Loss of weight is always a prominent symptom in ulcer cases. The patient becomes thin because nutrition is impaired, and he is often afraid to eat. On the other hand, gain in weight is very rapid when once the proper treatment is instituted.

Perforation of the stomach wall seldom occurs except as the climax of a long continued case. It requires hospital care and immediate operation. It comes on with sudden pain in the abdomen, great shock, rapid pulse, temperature, and sometimes

a chill. The abdomen becomes tender and very rigid. If an operation is not performed for it, peritonitis sets in and ends fatally.

Treatment: We would not have the readers of this chapter feel that they could, from the information herein given, treat themselves or their relatives, for an ulcer. Such an attempt would be indeed foolhardy, if not criminal. The object of what



X RAY PICTURES OF THE STOMACH

Left: Normal Stomach. Right: Stomach Dilated as Result of Ulcer.

is here written is to direct attention to this trouble, and help to an understanding of its underlying principles in a general way. Any person suffering from an ulcer should at once obtain competent, personal professional advice.

For many years, there has been much discussion between physicians and surgeons as to whether ulcer cases should have medical or surgical treatment, and the surgeons have had the best of the argument; but within recent years, there has been a considerable change of opinion, which tends more and more to favor the physicians and medical treatment. Every case of ulcer has the right to medical treatment first; and in skilled hands, the great majority will be healed. If this fails, then there should be an operation. The number of cases unhealed after intelligent medical care, is yearly growing smaller. Dr. B. M. Sippy, of

Chicago, has evolved a method of treating ulcer that has revolutionized the treatment of this malady, and proved not only a success and satisfaction to the physician, but a great blessing also to the sufferers. It has become known throughout the world as the Sippy treatment.

The treatment is based upon a few simple principles, which will here be briefly explained. An ulcer in any tissue of the body will heal provided all irritation is removed. The stomach is no exception to this rule. The digestive juice, as has been demonstrated, is the irritating factor that keeps the ulcer active. Hence its action must be removed to permit the tissues to heal. The fact has been pointed out earlier in this chapter, that the digestive juice, with its ferments, is active only in the presence of hydrochloric acid. Thus if the acid is neutralized, the gastric juice will be inactive, and the ulcer will have its chance to heal, because all irritation is then removed. An alkali powder is therefore given to the patient, often enough and in sufficient strength to neutralize the acidity of the stomach. Fluid is withdrawn from the stomach at intervals of a few days, to determine whether or not all the acidity is neutralized. Meanwhile the food is handled by the pancreatic and intestinal juices. It is possible to live after entire removal of the stomach, and no harm results during the period of this treatment in which the activity of the gastric juice is checked, because the intestinal juices are able to do the work.

The next important step is to administer such foods as will prevent as much as possible the secretion of acid; also to take out of the diet coarse and bulky foods that would irritate the ulcer through their very coarseness. It has been learned from experiments, that anything of a fatty or oily nature prevents the secretion of hydrochloric acid, and also delays the emptying time of the stomach. It is soothing to the nerve endings in the linings of the stomach, and quiets both secretions and muscular activity. Therefore fats are used freely, mainly in the form of milk and cream, with other non-irritating foods, such as custards, soft eggs, and gruels. The feedings are small and frequent, and the diet is increased gradually from milk in the beginning to a full diet at the end of treatment. The healing of an ulcer requires a long time, varying from a few months to a year and a half.

CANCER

The reader will find information on the subject of cancer of the stomach, in chapter 77.

SWALLOWED FOREIGN BODIES

This subject is discussed thoroughly in chapter 27.

Diseases of the Intestines

CONSTIPATION

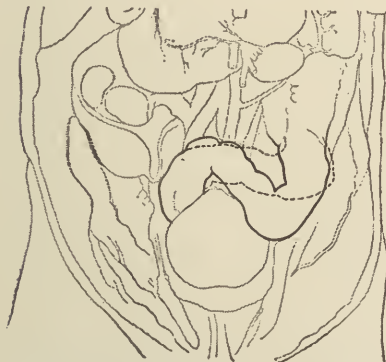
This is one of the most prevalent maladies afflicting the human race. It is so common that many dismiss it from their minds, thinking it has to be borne, and that there is no remedy. This is far from true. No person need suffer of constipation unless he is in an advanced stage of some other organic disease that could occlude the intestine, such as a tumor, or bands of adhesions following an operation.

Causes: A prolific cause of constipation is lack of sufficient bulk in one's diet. When one eats milk, cream, butter, eggs, and cereals, nearly all the bulk of the food is broken up, digested, and absorbed, leaving very little residue; but when one eats such foods as spinach, lettuce, asparagus, celery, beets, carrots, turnips, squash, and pumpkin, there is a large residue of cellulose undigested and unabsorbed, which is absolutely essential if the bowels are to function normally. Failure to understand this fact and act upon it, is a mistake made by many who think they do not like vegetables. Mistaken ideas regarding what we like or dislike often stay with us through life.

Lack of Fruits: Failure to eat sufficient amounts of fruit is also a frequent cause of constipation. The mild acids contained in fruits are effective stimulants to the liver and all intestinal juices. They also exert a strongly antiseptic influence over the entire tract, and greatly assist in reducing fermentation. They stimulate the peristaltic action—that is, the involuntary, contractile movement of the bowels which continually forces the food onward and downward—and are nature's wholesome cathartic. There are patients with certain derangements who cannot eat fruits, or who can eat them in limited amounts only. Such cases should have the advice of a physician. The question of diet in constipation will be taken up again and in more detail under the heading of "Treatment."

Heedlessness of Nature's Warnings: Neglect to answer the call of nature is another common cause of this ailment. By looking at cut on page 293, it will be seen that the rectum is separated from the intestine leading to it, by a sort of valve, or closed part of the intestine, which is formed by a sharp bend at that point. This valve is formed exactly as you would shut off the water in a hose by doubling the hose over and holding the two

pieces in the hand. The pelvic loop is raised out of the pelvis to a higher position as fecal matter is filled into it. (See dotted line in cut.) When this occurs, the valve, or closure, is opened, because the intestine is straightened out; and fecal matter is then pushed into the rectum. As soon as this comes in contact with the mucous membranes lining the rectum, information that an evacuation is necessary is at once "telegraphed" to the intelligence. Failure to heed this "call" without delay eventually ends disastrously, because the nerve endings in the delicate membranes lining the rectum soon become dulled and are unable to continue to telegraph the need for evacuation.



The dotted lines show how the pelvic loop is raised out of the pelvis to a higher position as fecal matter is filled into it.

Among school children, and also among oversensitive persons working in offices or other public places, the call to evacuation is frequently put off because the toilet is too public, or not a suitable place to go to, or the teacher may unwisely refuse the children permission to go when the need is urgent. Whatever the reasons may be for putting off the call, they are all active causes of constipation.

At each evacuation, only the descending colon (page 293) is emptied. Here the fecal matter is collected slowly as it is delivered to that portion of the canal by the upper portions of the tract. This descending colon, and especially the lower part, or pelvic loop, lies upon the psoas muscle, which muscle contracts at each step one takes in walking. This action of the psoas muscle in walking is very stimulating to the bowel, especially when the bowel is full, to empty itself. Therefore the sedentary life is a common cause of constipation. Neglect to take proper exercise is unsafe for anyone, and there is no exercise more beneficial than walking. As lack of exercise is a cause of constipation, thus indirectly the automobile and other modern means of transportation are causes of this universal trouble.

Women are much more subject to constipation than are men. This is due to many things, among which may be named differences in the anatomy of the pelvis, the more sedentary life they lead, improper care at the time of childbirth, as neglect of lacerations, getting on the feet too soon afterwards, overwork, *et cetera*.

The Cathartic Habit: One of the most vicious of all causes of constipation is failure to allow the bowels to have the proper time and opportunity to perform their work—in other words, the cathartic habit. If the bowels do not move exactly when and how the patient thinks they should, he resorts to a cathartic, nine times out of ten. Many persons take a cathartic regularly every ten days or two weeks, “to clear the blood,” or “to ward off a bilious attack.” This is an entirely erroneous idea, and one which works much harm. All cathartics act by irritating the bowel, and they all likewise leave its lining membranes congested. Every time a cathartic is taken, the patient is left worse off than before, unless there is some acute condition demanding immediate and thorough evacuation of the bowel. In that case, we should always choose the lesser of the two evils; but even then it is usually better that a cathartic be taken only upon the advice of a physician. The more cathartics are taken, the more constipated the patient becomes, because the continued irritation of the cathartic deepens the inflammation in the walls of the intestine. Hence what is considered by most people as about the only treatment for constipation, is in reality one of its foremost causes.

The Enema Habit: Second only to the cathartic habit is the enema habit. We recently had a patient who had not had normal bowel movements in thirty years. She had depended entirely upon cathartics and enemas, mainly enemas. While convalescing from an operation many years before, she had been greatly relieved by the use of an enema. From that day, whenever she felt bad, she invariably resorted to an enema. The result was that she ceased to have normal bowel movements. It took considerable time and effort to convince her that the enemas were not necessary. She was convinced, however; and at this writing, she is having normal and regular bowel movements. Enemas injure the bowels by continually washing away intestinal juices, and by putting into the bowel a substance (water) that is not a normal content. The concentration of salts in the water is not identical with the concentration of salts in the blood; therefore the osmotic action alone is a great irritant. Whenever an enema is taken, a level teaspoonful of common table salt should be put into the water for each pint used.

Symptoms: It is hardly necessary to write much on the symptoms of constipation. They are too well known. The patient falls into a condition in which it seems to him impossible to get the bowels to move without artificial help. He thinks himself to be very toxic. But these symptoms do not arise from absorption of poisons; they arise from irritated mucous membranes and nerve endings in the intestinal tract. The patient has a

coated tongue and bad breath; he is a constant sufferer from headache, and generally has a bad complexion. Frequently he suffers from what he himself terms "indigestion" or "dyspepsia." As stated before, these are simply referred symptoms from the intestinal irritation that prevents the stomach from performing its normal function. A majority of patients are relieved of their "stomach trouble" by removal of their constipation. Constipation is also a prolific source of "nerves." It is often indirectly responsible for bad temper, and may be cited as one of the causes of disrupted homes. Loss of weight is often a symptom, although obese patients may suffer severely from constipation.

Treatment: Let us cite a case that may serve to emphasize an important principle in treatment. The patient was badly constipated, but like many women, seemed to regard this as a necessary evil, and did not give it much attention. She became very ill, however, from another cause, and spent a long time in bed in a hospital, during which time she underwent an operation, and was kept for weeks afterwards on a liquid diet. Very much to her surprise, and to her physician's also, upon recovery from her operation, she was no longer constipated. What really happened to her was that her long rest, and her diet free from all irritating substances and bulky residues, had permitted the bowels to be healed of their inflammations, and they were thereafter able to perform their functions normally. The treatment of constipation is based upon this simple principle; that is, to remove all irritations, and allow the bowels to heal themselves and do their work normally.

Dietetic treatment is of the utmost importance. Constipation falls generally into two main classes — *spastic* (spasmodic) cases, in which the inflammation has caused the colon to become so irritable that it constantly contracts and does not allow fecal matter to pass except with difficulty; and *atonic* cases, in which the inflammation and irritations have caused an atony, or general relaxation of the muscles of the tract, and through sheer loss of power they are unable to propel the contents of the intestine along. The treatment of these two types is widely different as far as dietetics is concerned. We will therefore consider them separately.

Diet in Spastic Cases: In these cases, it is necessary to rest the bowel, which must relax and heal its irritation and inflammation. This is done by taking all bulk out of the diet, and eating only those foods which are non-irritating and leave very little residue. When such foods as milk, eggs, strained soups and broths, are eaten, they are nearly all digested and absorbed, leaving practically no residue to irritate inflamed surfaces.

After this is done, the patient should very gradually add bulk as the bowel is able to endure it. When vegetables are first taken, a *purée* should be made of them, and eaten very carefully. Spastic constipation is incipient colitis, and unless it receives proper attention, will eventually result in a severe case of that disease. The reader is here referred to the discussion of the treatment of colitis, farther on in this chapter, for diet lists in this type of constipation.

Diet in Atonic Cases: In atonic constipation, an abundance of bulky food should be provided, in order to stimulate the musculature of the tract to activity. The patients need to eat as much bulky food as possible. They are benefited by the use of bran in the diet; while the spastic cases, discussed in the preceding paragraph, are injured by its use. The following is a good diet list for this type of constipation:

BREADSTUFFS: Whole wheat, Graham, or rye breads that are twenty-four hours old at least; corn bread, corn muffins, salt-rising bread, bran muffins, Graham or oatmeal crackers, and muffins made from Roman meal, which contains bran and flaxseed.

VEGETABLES: Any vegetables may be used, excepting onions and garlic. Onions are a wholesome food for a well person, but their aromatic oils are irritants to mucous membranes already inflamed. Vegetables especially good are spinach, lettuce, asparagus, celery, beets, beet tops, carrots, turnips, squash, pumpkin, string beans, green corn, kale, chard, fennel, peas, artichokes, cabbage, Brussels sprouts, cauliflower, endive, potatoes, both sweet and Irish. Sweet potatoes are slightly more laxative than Irish. Tomatoes and legumes also are very good in these cases.

FRUITS: Nearly all fruits can be used; but those most serviceable are figs, prunes, pears, dates, baked apples, pineapple, raisins, any seedy jams, quinces, apricots, peaches, and fresh grapes. In the eating of fruits for this type of trouble, care must be used about their combination with other foods. The reader is referred to chapters 22, 23, for instructions on combinations.

CEREALS: There are no restrictions whatever in the matter of cereals. Those best adapted are the ones containing the whole grain with its bran envelope. In fact, bran may be added advantageously to other cereals as they are used.

BEVERAGES: The patient may drink milk, buttermilk, water, cereal coffee, and malted milk. Fruit juices are all right, but are best taken between meals.

PASTRIES: One-crust pies, as pumpkin, squash, lemon, and custard, make comparatively wholesome desserts. Cake, such as angel food, or any simple kind that is not too rich, is allowable.

MISCELLANEOUS: Eggs, cooked salad dressings, cottage cheese, olives, and any salad that is free from onions, may be used. Gelatins, jams, and jellies are permissible. Honey is a very good food in these cases. Fats have to be taken in moderation, because they slow up the peristaltic action, especially in the stomach and early parts of the tract. Some fats have to be taken, however, to care for the body's needs. Olive oil and mayonnaise, with a few nuts, will supply this need. All fats should be reserved for the close of the meal. They should never be taken at the beginning of the meal. By observance of this rule, their retarding action on peristalsis is very much lessened.

Medicinal Treatment: The old time-honored purge that many look upon as a harmless thing, is in reality a most harmful thing. Cathartics of all kinds increase irritation and inflammation in the bowels; and after every one taken, the patient is worse off than before. They should never be used except upon the advice of a physician, or in emergencies, as stated elsewhere in this chapter.

Certain salts of bismuth and calcium, however, act as healing agents in the tract and are of great benefit. The following prescription taken after meals and at bedtime will greatly assist all constipated cases:

R	
Bismuth subnitrate	2 drams
Calcium carbonate	2 drams
Calcium phosphate	2 drams
Directions: 1 teaspoonful in water to be taken after meals and at bedtime.	

This prescription contains no laxative, neither is any part of it absorbed into the blood.

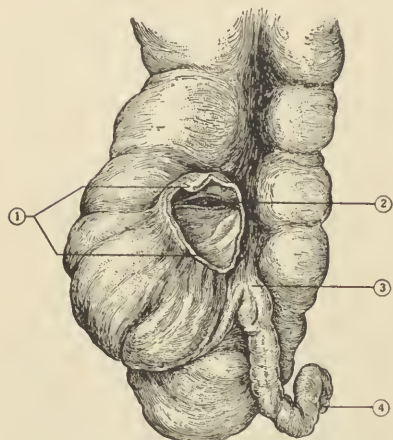
Mineral oil may be used with benefit, especially in the spastic cases. It is one cathartic that is not injurious. However, it slows up peristaltic action a little in the atonic cases.

The injection of three ounces of cottonseed oil into the rectum at bedtime, to be retained overnight, is of the greatest value. This softens the fecal matter, makes it more easily passed, and is very soothing to irritated mucous membranes. In the morning, the oil will be passed off, and whatever fecal matter is in the lower bowel will come with it. Nothing more should be done in this line until the next evening, when the procedure should be repeated. This alone will sometimes cure obstinate cases of constipation. If there is no bowel movement at all during the day, a small saline enema of one pint may be taken to cleanse the rectum before taking the oil; but this should not be done unless there is difficulty in retaining the oil without it. A three-ounce rectal syringe for injecting the oil can be obtained at any drug store.

Hygienic Treatment: It is important to answer immediately the call to evacuate the bowels, or, if there is no call, to go at a regular definite time and make an attempt at evacuation. The best time for this is within an hour after breakfast. The taking of food into an empty stomach is one of the most powerful stimuli to the peristaltic action. After eating, therefore, is the most opportune time for an effort at evacuation. If nature's "telegraph call" to evacuation has been lost, proper attention to this detail as already described will eventually restore it.

Massage to the abdomen is of great value if properly given. (See chapter 11.) In the spastic cases, the massage has to be confined entirely to the right side of the abdomen. This is because the colon here is usually distended with fecal matter that is unable to pass the spastic parts of the colon beyond it. Massage in that particular region stimulates it to make better efforts toward emptying itself. In the atonic cases, massage to the entire abdomen is of great value.

Fomentations to the abdomen, especially the left side and the lower abdomen, are of great value. They should never be neglected. Fomentations are of assistance to all cases. They quicken the circulation and hasten the healing process. (See chapter 10.)



View of the cæcum, or beginning portion of the colon (large bowel), and the appendix

1. Junction with the ileum, or last portion of the small intestine
2. Opening of the ileocæcal valve
3. Base of the appendix
4. Tip of the appendix

APPENDICITIS

This is an inflammation of the appendix. (See color plate, page 23.) It may be either acute or chronic. It may be very severe, taking the patient's life, or it may be so slight as to escape the attention of both physician and patient.

Causes: Appendicitis is caused by an invasion of the tissues of the appendix by the colon bacillus, which is always present in fecal matter, or by other disease-producing bacteria. Anything that lowers the vitality of the tissues is

indirectly a cause of appendicitis. We must therefore name constipation, diarrhea, fermentation, and all digestive disorders as causes. It is a normal thing for the intestinal contents to enter the appendix, but sometimes they are prevented from getting back into the intestine. This is due to kinks and narrowed portions of the appendix. The fecal matter becomes dried, forming stonelike concretions. After this occurs, it is all the more difficult for this concretion to get past any narrow portions. Many times the causes are unknown. Adhesions following operations for other ailments may cause trouble in the appendix, by immobilizing it and preventing it from emptying itself.

Symptoms: In acute appendicitis, there may be chills, followed by fever; or the chills may be so light as not to attract the attention of the patient. There is marked rigidity of the right side of the abdomen. The patient is unable to relax the muscles over the appendix. There is pain and tenderness in the right side, usually centering at a point halfway between the navel and the crest of the hip bone. There may be either constipation or diarrhea. If there are adhesions between the appendix and other organs, there may be symptoms in the pelvis, causing trouble with the menses; or, if there are adhesions with the bladder, there may be pain there. On account of the gall bladder and the appendix both being on the right side of the abdomen, and also on account of possible adhesions to the colon, there is likelihood of confusing gall bladder disease with appendicitis. But the fever, marked rigidity of the muscles, with pain and tenderness at the point halfway between the navel and the hip bone, are the cardinal symptoms in the diagnosis.

The diagnosis of appendicitis should not rest with the family friends or the patient. A physician should be called who is skilled in diagnosis and who can give the patient the advantage of laboratory work, such as cell counts of the blood, *et cetera*.

In acute appendicitis, pain is practically always the first symptom noticed by the patient. After several hours, the seat of the pain seems to change to the region of the appendix. Every severe pain in the abdomen which lasts for several hours demands the care of a physician.

Treatment: It is most important that the treatment of appendicitis be understood by all. A considerable proportion of cases of acute appendicitis, if not treated very early by surgical removal of the diseased appendix, become very grave, and many of the patients die. It is not always possible to decide from the symptoms whether a given attack will pass without becoming severe, or whether it will kill the patient if an operation is not performed for it. Therefore the only safe rule is to have the appendix removed in every case of definite acute appendicitis. And this should be done, if practicable, within the first twenty-four or forty-eight hours of the progress of the disease. Of course, a competent surgeon should be employed. These facts are so well known among a large proportion of the people, that it hardly seems necessary to dwell upon them; but despite the widespread knowledge concerning this disease, one still frequently meets with cases that have been neglected and that result fatally, simply because they were not treated surgically as early as they should have been.

Some of the means that can be used to relieve suffering in this condition are the emptying of the bowels by enema, the use of hot applications and sometimes of the ice bag over the portion of the abdomen involved, and the withholding of food; but these remedies must not take the place of the surgical treatment.

One of the most essential points to be emphasized is, never to use opiates or similar means to relieve pain in this condition, as it may mask the symptoms to such a degree as to interfere with a recognition of the gravity of the case by the physician.

"Interval operations" are sometimes advisable. This means that when a person has had one or two attacks of appendicitis, and for any reason has not had an operation at the time, it is well to remove the appendix between attacks, because otherwise the attacks will usually occur again.

INFLAMMATION OF THE COLON (COLITIS)

Conditions described under "Constipation" (especially the spastic type) can become so aggravated that the inflammation in the colon overshadows everything else. In other words, one of the ways of describing colitis is to say that it is a much-exaggerated and greatly irritated case of spastic constipation. "Colitis" means inflammation of the colon; it may be and often is, of the entire colon, but the descending colon is most frequently the seat of trouble.

Symptoms: The patients are extremely nervous. In fact, colitis is one of the causes of the nervous breakdown of which we hear so much. There is pain with bowel movement, and tenderness on the left side of the abdomen. There are discharges of large amounts of mucus, and the bowel movements are too frequent and very mushy. The normal stool is firm enough to hold together after being discharged. In colitis, the stools are soft, and contain large amounts of mucus. The patients have gas and abdominal distress. These cases may become so severe as to form an ulcerative type. All symptoms are then exaggerated, and there is blood in the stools.

Causes: The nervous strain of the twentieth century business and social life is one of the large factors in the causing of this condition. All the causes written for constipation are also causes of colitis. (See under "Constipation," in this chapter.) The exhausted society woman trying to keep up with the conventional demands that are beyond her strength, and the tired business man who is fighting to prevent a financial crash, are typical patients of this class.

Treatment: These patients are best treated by getting them away from the family and home surroundings. They should be

put to bed in a hospital or sanitarium where the proper modern treatment can be administered. All irritation to the bowels is removed by giving them a liquid diet. The sheet anchor of treatment consists in avoiding all irritation to an inflamed colon. It is therefore necessary to eliminate all bulky residue from the diet until the stools are dried out sufficiently to be formed, and get down to one or two a day. Bulk is then very gradually added, a beginning being made with foods that have slight residue; then after these are accommodated, and the stool still remains normal, the patient can be by degrees restored to a full diet. Suggestive diet lists are herewith given, in their order, through which the patient can be slowly carried. It should take at least two to three months to go through these three lists, with the average case of colitis. The decision as to when to pass from one list to the next, should depend upon the condition of the stools. When they stay firm and formed on one list, and remain thus day after day, the patient may then gradually be worked onto the next list.

LIST NO. 1

Boiled milk, with two teaspoonfuls of limewater added for each glass; malted milk; strained gruels, made from barley, oatmeal, cream of wheat, rice, or corn meal. These should be strained thoroughly through cheesecloth, and may be seasoned to taste. Vegetable broths may be used, but they also should be carefully strained through cheesecloth. The best of all broths is made from tomato. The tomatoes should be stewed as for the table, then strained to get the clear broth. Vegetable soups can be used in the same manner, but all onion and onion flavoring must be excluded. While on this list, the patient should be very quiet in bed and be fed at least every two hours.

LIST NO. 2

Custards, yolk of hard-boiled egg (thirty-five minutes), butter, corn-starch puddings, sago, and tapioca may be used; but after baking, all undissolved parts of the sago and tapioca must be removed. All articles mentioned in list No. 1 may also be used in list No. 2. Soda crackers may be used very sparingly and carefully toward the close of this list, or just before starting on list No. 3. While on list No. 2, the patient should eat about every three hours.

LIST NO. 3

Poached or soft-boiled eggs; thoroughly toasted white bread, with butter; macaroni and spaghetti, without cheese; rice, cream of wheat, farina, germea, *et cetera*. If these are borne well, without the stools' becoming too loose, *purée* of vegetables, such as peas, corn, and spinach, also creamed spinach, may be carefully added; next, mashed potato, and squash or pumpkin custards. Plain white bread that is at least twenty-four hours old may also be included in this list. Olive oil and mayonnaise may be used sparingly. Sponge cake or angel food with ice cream may be eaten for desserts if the ice cream is eaten very slowly. Jello may also be used for desserts.

The length of time in bed varies from three to six weeks. The rest in bed is very essential, and no case of colitis can be thor-

oughly healed without it. While in bed, the patient should have fomentations to the abdomen, especially to the left side, every three hours. (See chapter 10.)

The medicinal treatment consists in taking three ounces of hot flaxseed tea thirty minutes before the first nourishment in the morning, and taking the following intestinal powder:

R

Bismuth subnitrate	2 drams
Calcium carbonate	2 drams
Calcium phosphate	2 drams

Directions: 1 teaspoonful in water every 3 hours.

This prescription is identical with that on page 321, but the directions differ.

This powder acts as an intestinal antiseptic and as a soothing agent to quiet irritations and inflammations. It forms a coating over irritated surfaces and assists in their healing. It also provides some bulk (which is without irritation) while the patient is on a liquid and non-bulky diet.

Colitis cases are generally of a very nervous temperament. They are people that require frequent vacations and changes of scenes and work. After they have recovered sufficiently to get out of bed, an ocean voyage or other quiet recreation and change is a valuable adjunct.

ACUTE DIARRHEA

Causes: Diarrhea is caused usually by spoiled or improper food, which creates such an irritation that nature attempts to get rid of it by means of the diarrhea. Again, it can be caused by excessive fermentation, even though the food may be wholesome when eaten. Acute diarrhea from spoiled food is commonly called, among the laity, "ptomaine poisoning." In other words, the by-products of the spoiled or fermenting food, called ptomaines, have so irritated the bowel as to set up a diarrhea. The foods most often guilty are fruits improperly preserved, or canned foods, and foods kept in tins. Eating when extremely nervous or under excitement may also produce diarrhea. In children, it is often called cholera morbus, cholera infantum, or flux.

Treatment: The patient should be put to bed, and have a large, saline enema (two quarts, temperature 110°). He should then have fomentations to the abdomen every two hours. The diet should be boiled milk alone until the bowels are checked. He should then work very carefully back to a full diet, beginning with rice, yolk of hard-boiled egg, thoroughly toasted bread, *et cetera*. If this treatment does not relieve the difficulty at once,

a physician should be called, as medicines sometimes must be administered before the inflammation thus started in the bowels can be checked.

CHRONIC DIARRHEA

This condition may be also a colitis. (See under "Colitis," in this chapter.) It may be caused by tuberculosis of the bowels. There are also many parasitic diseases, as sprew, amœbic infection, and many others, that have chronic diarrhea as their major symptom. No intelligent person should permit a diarrhea to continue beyond a day or so unchecked, without consulting a dependable physician; for many of these conditions are serious, and result in a lifetime of invalidism. Chronic diarrhea requires a close study of the stools under the microscope, and many other things that the laboratory alone can provide. It is therefore needless to attempt much discussion of this ailment and its treatment here. If you are suffering of a chronic diarrhea, secure professional advice at once.

INTUSSUSCEPTION

This is a very serious intestinal obstruction caused by a telescoping of the bowel. The swelling resulting from this telescoping shuts off the bowel entirely. It is a dangerous condition, and one which has to be recognized immediately and put into the hands of a surgeon for operation without a moment's delay if the patient's life is to be saved.

Causes: Excessive exercise or a blow upon the abdomen may result in this condition. Violent cathartics or fecal impaction may set up such heavy peristaltic waves as to cause a telescoping, or intussusception. Acute diarrhea from ptomaine poisoning can also produce it. But many times the cause is unknown.

Symptoms: There is a rather sudden, severe pain in the abdomen. There are symptoms of shock; namely, cold perspiration, poor pulse, feelings of faintness, pallid skin, and weakness. There may be slight movements of the bowel that will evacuate the fecal matter situated below the seat of the trouble. Thereafter nothing passes the bowel except a little bloody mucus. If the trouble is high up in the tract, there is practically no secretion of urine from the kidneys; if it is lower down, this symptom may not be present. As the condition progresses, nausea comes on, and vomiting develops, which later has a fecal odor.

Treatment: The only treatment of this condition is a surgical operation; and the quicker a surgeon is called, the better are the chances for life.

VOLVULUS

This is a condition very similar to intussusception; but instead of a telescoping of the intestine, there is a twisting of a loop. The symptoms and the treatment are the same as for the foregoing. There are a number of other cases of gradual or acute obstruction of the bowel, but they must all be treated by the surgeon.

PILES (HEMORRHOIDS)

Hemorrhoids are swellings containing dilated veins, situated in the mucous membranes of the rectum and the skin just outside its sphincter muscle.

Causes: Veins, unlike arteries, have not sufficient strength in their walls to support much blood pressure. This is why veins near the surface, without the additional support of muscles and other deep structures, frequently become distended (varicose). The veins around the rectum have not much support from other tissue; they therefore distend easily. They are branches of veins very closely related to the hepatic (liver) circulation; hence anything producing congestion in the circulation of the liver, increases the pressure in these rectal veins, and is a cause of their distention. Constipation, and all the things that lead to it, are causes of hemorrhoids. Straining at stool is a prolific cause. Deranged pelvic conditions in women, such as unrepaired lacerations, are also many times responsible for this condition. The irritation of fermented stools, or any diarrhea, may also be a cause.

Symptoms: There is great pain and an aching in the rectum, and itching both in the rectum and in the skin around it. In long-standing cases, there is oozing of blood from the hemorrhoids which sometimes amounts to a considerable hemorrhage, usually occurring in connection with the act of emptying the bowels. Piles may protrude from the rectum, or they may not, this depending upon how high up in the rectum the affected veins are located. When they are located low in the rectum, they generally protrude in lobulated form. When they protrude, the sphincter muscle of the rectum partially strangulates them and prevents their return until they are replaced by artificial means. All together it is a painful and distressing malady.

Treatment: The most important thing in the treatment is the correction of all digestive errors, so that the stools may pass with the least possible irritation. If the hemorrhoids protrude, they should be returned to the rectum with the greatest care and cleanliness. Small dilators may be used for this, and they will at the same time compress and empty the veins, thus giving them an opportunity to regain their tone and contract of their own

accord. It is essential, if the case is severe, to keep off the feet, in order that blood pressure may be reduced and the protrusion corrected by giving the hemorrhoids the advantage of gravity in staying replaced in the rectum.

Alternate hot and cold over the rectum and the entire perineum is one of the best remedies. These should be repeated every two or three hours, and will be found very efficacious, especially if the patient is staying in bed. The ice bag is also very beneficial in shrinking the veins, relieving congestions and pain. In cases that become chronic, surgery is the only means of complete relief.

ISCHIORECTAL ABSCESS

Oftentimes the rectum becomes so inflamed through irritation, that infection takes place, and comes to a head just outside the rectum, forming an abscess that has to be lanced. These abscesses may be caused by inflammation from any source, as hemorrhoids, severe diarrhea, or passing of foreign materials that could injure the mucous membrane.

Symptoms: In the beginning, there is tenderness around the rectum, which increases rapidly to severe pain. Redness and swelling soon appear, with rise of temperature, and a general bad feeling on the part of the patient. Chills are frequently a symptom at the onset.

Treatment: These abscesses usually clear up and give no further trouble as soon as they are lanced and drained by the surgeon. They may, however, leave a permanent fistula into the rectum which will require more extensive surgery, and which in some instances is never entirely eradicated. It is therefore important that these ischiorectal abscesses receive proper attention.

ITCHING ANUS (PRURITUS ANI)

This is a condition of itching which occurs in the skin around the rectum, and becomes so distressing as to require treatment. There is usually a great puckering of the skin in radiating lines from the rectum. These are practically the only symptoms, but persons afflicted with this malady are indeed great sufferers.

Causes: The one great cause of this malady is incomplete evacuation of the rectum at the time of bowel movement. The remaining fecal matter in the rectum is the source of irritation that causes the severe itching. All disorders of digestion, especially fermentation, are also causes, mainly because they are a source of reflex irritation and partially responsible for the incomplete evacuation.

Treatment: The patient should carefully correct every wrong habit and all known errors in diet. If hemorrhoids are present,

they should be cured before relief is expected. After these things are done, infinite pains should be taken in the care of the parts after bowel movement. Only the softest toilet paper should be used, following which the parts should be washed with tar soap and water. Most important, however, is the obtaining of a complete evacuation. If this cannot be obtained by effort on the part of the patient, it should be obtained by means of a one-pint cleansing enema immediately following bowel movement. This, in a great majority of cases, will provide complete relief. In cases not thus relieved, it is well to submit to a slight operation, which can be performed by surgeons giving special attention to such diseases.

FISSURE

Any long continued irritation of the rectum may cause cracking of the mucous membrane over the sphincter muscle of the rectum; and from constant irritation, this cracking may become permanent. The forcible expulsion of hard, constipated stools, and especially those containing some foreign substance, may tear the mucous membrane at this site, thus producing an irritation that it is difficult to heal. These cracks at the outlet of the rectum are commonly known as fissures.

Symptoms: Such fissures are usually at the posterior side of the anus. There is dread of bowel movement, because of the pain it causes. The feces are often stained with bright red blood from the fissure. There is generally constipation and considerable nervousness.

Treatment: These conditions are prevented by normal bowel movement and good digestion. Strict cleanliness of the anus after bowel movement is also essential. When the fissures are once formed, their treatment consists in a thorough dilatation of the sphincter of the rectum, a thorough curetting of the fissure, and a few stitches to close it, by a surgeon. After the operation, movement of the bowels is avoided for a sufficient length of time to allow the fissure to heal before being again disturbed.

Intestinal Worms

On the whole, the presence of numerous kinds of parasitic worms in the intestines of human beings is quite frequent. Of the several different varieties, most of these are more frequently found in children than in adults. They are especially common in tropical countries. Several years ago the writer made an examination of the intestinal contents of 122 children in public institutions in the state of Tennessee, and found practically fifty per cent suffering of the various kinds of intestinal worms. In some, there were a number of kinds associated in the same case.

These worms, of course, secure their food supply from the contents of the digestive tract in which they dwell, or from the patient's blood.

They are principally in two classes, tapeworms and roundworms.

TAPEWORMS

1. *Pork tapeworm* (*Tænia solium*), 2 to 10 feet long, head small, globular, with 26 to 28 hooklets and 4 sucking disks.

2. *Beef tapeworm* (*Tænia saginata*), 12 to 24 feet long, head pear-shaped, no hooklets, 4 sucking disks.

3. *Fish tapeworm* (*Bothriocephalus latus*), 15 to 30 feet or more in length, head with sucking grooves, no hooklets.

4. *Dwarf tapeworm* (*Hymenolepis nana*), $\frac{1}{4}$ to $\frac{1}{2}$ inch long, 4 sucking disks, and single ring of hooklets. The intermediate host is the rat.

5. *Hydatid cysts* (*Tænia echinococcus*), $\frac{1}{8}$ to $\frac{1}{4}$ inch long in rat's intestine. The larvæ live in the flesh of man.

ROUNDWORMS

1. *Common roundworm* (*Ascaris lumbricoides*), 5 to 15 inches long.

2. *Threadworm*, pinworm, seat worm (*Oxyuris vermicularis*), $\frac{1}{16}$ to $\frac{1}{2}$ inch long.

3. *Whipworm* (*Trichuris trichiura*), $1\frac{1}{2}$ to 2 inches long.

4. *Hookworm* (*Necator americanus* and *Anchylostoma duodenale*), $\frac{1}{3}$ to $\frac{1}{2}$ inch long.

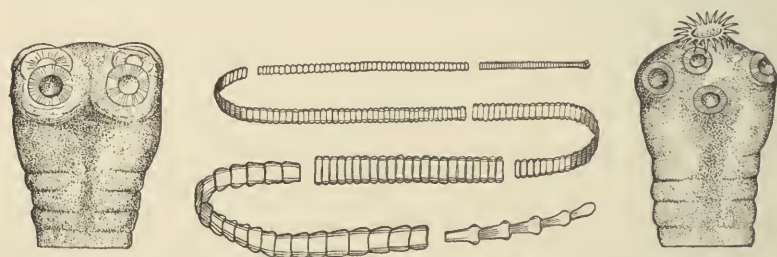
5. *Trichina* (*Trichinella spiralis*), $\frac{1}{16}$ to $\frac{1}{7}$ inch long, adult form.

TAPEWORMS IN GENERAL

Ordinarily the tapeworms have a double life history, the larva or early state of its growth after hatching from the egg

being found in the flesh of some one of the lower animals, as hogs, cattle, *et cetera*, but the adult worm lives in the human intestine. Uncooked meat containing the larvæ is the medium by which the worms find their way into the digestive tract of man.

Tapeworms have the form of segmented ribbons. The head is very small, and is armed with sucking disks and often with hooklets, by which means it maintains its attachment to the intestinal wall. Its food supply is absorbed through its skin from the contents of the intestine where it resides. The segments are very small near the head, but increase in size farther down, having a slender, threadlike neck. The old segments gradually drop from the lower end as new segments are formed. The eggs are produced in the older segments, and are discharged into the surrounding intestinal contents, and thus find their way into the outer world. Often the segments that drop off and es-



Left: Head of Beef Tapeworm. Center: Body of Tapeworm. Right: Head of Pork Tapeworm.

eape with the bowel movements contain great numbers of the eggs. These later are eaten by lower animals, as the swine, in whose stomach and intestines they hatch and develop, then find their way into the muscles or other parts of the body, and become encysted or quiescent there, until the flesh of the animal is eaten by a human being. The worms then are liberated in the stomach of such a person, and develop into the fully grown worm in his intestinal canal — and the circle of the worm's life is complete.

The Pork Tapeworm (*Tænia Solium*). This disease is contracted by eating uncooked or imperfectly cooked pork containing the larva of the tapeworm. Such meat is called "measly" pork. The "measles" are little round bodies about the size of peas, which contain the small larval form of the worm. These larvæ are also capable of growing in the flesh of human beings in some cases. In human beings, they are especially prone to locate in the brain or the eye, where they may grow to the size of a walnut. As a rule, it is only the adult form of the worm which infests man.

In America, the pork tapeworm is much less common than the beef tapeworm. However, this form is found very frequently in North Germany, where pork is more generally eaten uncooked or partially cooked. The muscles of the body oftenest infested by the "measles" are those of the neck, tongue, and shoulders of the animal.

Symptoms: In many cases, there are no evident symptoms; but in some, they are pronounced, such as abdominal pain, nausea, diarrhea, and occasionally the appetite is very ravenous, the patient eating large amounts. In some cases, various nervous symptoms are present. For treatment, see the closing paragraphs of this chapter.

Beef Tapeworm (*Tenia Saginata*). The larval or young form of this parasite is found mostly in the flesh of beeves, and the adult form is found only in the intestines of human beings. It is a larger worm than the pork tapeworm, being wider and growing to a greater length. The head has no hooklets, being armed only with four sucking disks. This absence of hooklets may account for the greater ease with which this worm is dislodged from its attachment to the wall of the intestine, when treatment is instituted. In many cases where the pork tapeworm is present, repeated treatments fail to dislodge the head, and the worm will grow again. As previously indicated, the beef tapeworm is a very frequent parasite as compared with the pork tapeworm. No doubt its frequency has been increased by some of the "raw-meat cure fads." This worm is said to be universal in Abyssinia, all persons having one or more in their intestines.

As with the pork tapeworm, the eggs pass out in great numbers with the patient's bowel movements, usually more being discharged in the segments of the worm, which are constantly being broken off from the lower end of the worm as they are renewed from above. These separated segments seem to have an activity of their own, and often escape from the bowel of their own accord. Of the large tapeworms, this is by far the most common seen in America.

The presence of either the pork or the beef tapeworm may sometimes be suspected from the patient's symptoms. These, however, are always uncertain, and one can be sure of the parasite's presence only by discovering the actual segments of the worm as discharged from the bowel, or by a microscopic examination of the intestinal discharges, to discover the minute eggs, which may be thus recognized. These eggs are generally discharged in large numbers.

The Fish or Russian Tapeworm (*Bothriocephalus*). This is the largest of the tapeworms infesting man. It is very rare in America. The segments are as much as half an inch in breadth, and it may have three thousand or more segments. When discharged from the human intestines, the eggs hatch out and the embryos swim around in water and in some way gain entrance into the bodies of fishes or other animals. The larval form lives in the flesh of the fish, and when this is eaten by man, the worm develops in his intestine into its large form. Fresh-water fishes, such as pike and perch, are the varieties that are oftenest infested. Salting or smoking the flesh of the fish does not destroy the larvæ, but thorough cooking does. The countries where this tapeworm is most frequently found are Russia, Switzerland, Japan, Madagascar, and Central Africa. A few cases have been reported in the northwest of the United States.

In many cases, this tapeworm causes severe anæmia, resembling the so-called "pernicious anæmia."

Dwarf Tapeworm (*Tænia Nana*). This is the smallest of the tapeworms infesting man, and the most frequent. It inhabits the small intestine, sometimes in small numbers, but often there are as many as one thousand in one intestine. The intermediate host is the rat. This worm is found oftener in children than in grown persons, and is very common in the United States. It may produce nervous symptoms. When it is present, there are many eggs in the bowel movements. These have a characteristic appearance, and are easily recognized by the physician with the microscope.

Hydatid Cysts (*Tænia Echinococcus*). This tapeworm differs from the other types considered, in that the adult form of the worm lives in the intestine of a lower animal, usually the dog, and the larval form invades human beings. It causes very remarkable growths in the tissues of the body, particularly the liver. It is comparatively rare in the United States. It is doubtless contracted by swallowing eggs that have been discharged from the intestines of the dog. When swallowed by man, these eggs hatch out, and the young parasites find their way into the tissues of the body, probably by way of the blood. One egg is apparently capable of producing numerous larvæ in the tissues.

The growths caused by these parasites in the liver or other organs are large, saclike structures containing clear fluid with the minute parasites attached to the inner surfaces of the sacs. The sacs, or cysts, may be single, but often many are associated together, and the entire mass may be as large as a child's head. The treatment for this condition is by surgical operation, by

which means they can be removed. The fluid in these cysts contains a poison; and if, during the operation for the removal, this fluid accidentally escapes into the abdominal cavity, its poisonous effects may be very serious and even fatal.

ROUNDWORMS IN GENERAL

Of these, the ordinary roundworm is considered to be the most frequent. However, in many of the warm countries, the hookworm is a great deal more common as a human parasite.

Common Roundworm (*Ascaris Lumbricoides*). This is a large, cylindrical worm with pointed extremities, the female being larger than the male. It lives chiefly in the upper part of the small intestine, but frequently wanders to other parts of the digestive tract. It may enter the stomach and be vomited up, or may find its way up into the throat, sometimes getting into the windpipe and the bronchial tubes, where it sometimes causes serious injury. There may be only one or two present, or there may be many.



Threadworms
Actual Size

The females produce large numbers of eggs, which are readily recognized by means of the microscope. These hatch into minute worms, largely outside the body of the patient. These embryo worms by some means find entrance into the digestive tract of man, and there develop and live. Without doubt, in many cases, the presence of these worms in the intestines gives rise to symptoms, especially in children. These include abdominal pain, fever, diarrhea, restlessness, grinding of teeth, and sometimes convulsions. In many other cases, apparently the presence of the worms causes no recognizable symptoms.

Pinworms, Seat Worms, or Threadworms (*Oxyuris Vermicularis*). This worm is a rather common parasite, notably in children. It inhabits the large intestine, and is often found in the rectum. The worms are usually present in large numbers and migrate through the anus and to the surrounding parts. They cause a great deal of itching and irritation, particularly at night. These worms are white in color and small in size, measuring from one sixth to two fifths of an inch, the female being larger than the male. The female lays large numbers of eggs, and there is great danger of infection's being carried to other persons, or of reinfection in the child itself. For treatment, see the closing paragraphs of this chapter.

Whipworms (*Trichuris Trichiura*). These worms are about two inches in length, and get their name from their peculiar shape, looking like a whip with a long, slender lash and a thicker

handle. The head end is represented by the lash. In some cases, there are found as many as one thousand worms in a single person. Like the pinworm, this parasite lives principally in the large intestine. Very rarely is its presence indicated by any symptoms. Like the other intestinal worms, it produces large numbers of eggs of characteristic shape and appearance.

Hookworms (*American Hookworm, Necator Americanus; European Hookworm, Anchylostoma Duodenale*). To a greater

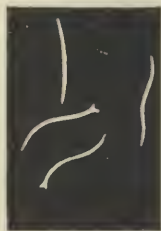


The Evolution of a Hookworm from Egg to Fully Developed Parasite

degree than any other of the intestinal parasites, these worms are the cause of serious illness. In many parts of the world, the disease is widespread, involving large portions of the population. In such localities, the health and vigor of the people is greatly undermined and their productivity diminished. The districts involved are confined to the tropical and subtropical regions, in the zone between 36° north latitude and 30° south latitude. Some of the countries most affected are the southern portion of the

United States, Central America, and the West Indies, especially Porto Rico, Central Africa and Egypt, India and the East Indian archipelago. In some districts, the infection involves one hundred per cent of the people. The worms are small and slender, not more than half an inch in length, the female being a little longer than the male. They occupy the upper portion of the small intestine, where they attach themselves to the mucous lining by means of the large mouth, which is armed with teeth-like structures. The name "hookworm" probably comes from the sharply curved neck. Two distinct types of the worms are recognized in different parts of the world. The kind that is most common in America is identical with the form found in Central Africa, which fact leads to the conclusion that the worms were introduced into this country from Africa by the bringing in of Negro slaves.

The female worms produce great numbers of eggs, which are ejected with the bowel move-



Hookworms—Actual Size

ments and hatch out after leaving the body. Contact with moist, warm soil favors the hatching of these eggs and the rapid development of the young embryos. These minute worms, in a few days, undergo several changes (molts), after which they are prepared to enter the body of a new victim. If any skin surface, as of the bare feet or hands, comes in contact with the moist earth containing these young worms—which are practically microscopic—they rapidly penetrate the skin and enter the blood vessels, and are carried by the blood to the lungs. From the lungs they gain entrance to the air passages, and make their way into the throat, and are then swallowed. Thus they reach the intestinal canal, where they develop into full-grown worms, and maintain their existence for several years, living to be six or eight years of age. The eggs produced by the worm cannot develop in the intestine, but must escape into the outer world in order to be hatched. Probably in some instances, the young embryos pass directly into the intestines, as when contaminated drinking water is used. In some of the severe infections, more than four thousand worms have been found in the intestines of one person.

Symptoms: The definite diagnosis of this disease can only be made by finding, in the bowel discharges, the characteristic eggs or the worms themselves. The effects of the presence of the hook-worm in the body vary greatly. In some cases where there are only a few worms, no definite symptoms can be discovered. In many others, more or less mild symptoms are produced, including some deficiency in bodily weight and vigor, and a mild degree of mental laziness. The symptoms are particularly noticeable in growing children, in whom there is a definite retardation of mental and bodily growth and development. In other cases, especially where the number of worms is large, the symptoms are very grave, and even death may result. A prominent symptom in the severe cases is dropsy or swelling of the feet or of the entire body, and the accumulation of fluid in the abdominal cavity (ascites). Along with this, there is a serious grade of anæmia, the coloring matter of the blood sometimes being only ten per cent of the normal amount. Death results in many of these cases. Many patients have the habit of eating dirt or chalk or other similar substances.

Eradication of the Pest. It is evident that the problem of preventing and eradicating this widespread disease is of paramount importance. The efforts to accomplish this must be directed along two lines: first, the relief of all the persons who have the worms, which is accomplished by administration of remedies to expel

all the worms from the intestines; second, the people must be taught how to prevent additional infection. The essential means of such prevention consists in the safe disposal of all human excretions. This, of course, means that the ground must not be contaminated by the material from the human intestine, and that absolutely protected outhouses must be provided and universally used. A survey of sanitary conditions in many portions of the United States as well as in other parts of the world gives ample proof of the need for enforcement of definite regulations in this matter.

Another phase of the disease should be mentioned. The soiling of the skin with contaminated earth and the resulting entrance of the minute worms into the flesh is accompanied by characteristic symptoms. These consist of itching and burning of the affected skin, followed by the formation of small papules and blisters, and later by crusts. These are oftenest seen on the feet, particularly of barefooted children. These sores are commonly called foot itch, toe itch, ground itch, dew poison, or water itch.

Trichina (*Trichinella Spiralis*). This is another roundworm that greatly affects the health of human beings. In contrast to the roundworms previously mentioned, these live for only a comparatively short time in the intestinal canal, but are distributed throughout the bodies of animals, where they remain quiescent for long periods. The disease is contracted in human beings by eating the flesh of animals containing the parasites in quiescent form. Practically always the contaminated meat is the flesh of swine eaten raw or partially cooked. When such meat is eaten, the little worms are liberated in the stomach and the intestine, where, in a few days, they grow to maturity and produce great numbers of young. These embryos burrow into the tissues and are carried throughout the body, and become encysted as minute coiled up worms, especially in the muscles. The adult worms in the intestine are small, but visible by the use of a magnifying glass in the examination of bowel discharges. After the contaminated pork is eaten, a period of seven to nine days is required for the full development of the brood of young embryos, which then are ready for distribution throughout the body.



Trichina

The frequency with which pork is infested varies in different localities. In some places, as high as two per cent of the hogs slaughtered have trichina. It is evidently a more frequent infection in man than is supposed. Some investigations indicate that

as high as five per cent of the population are infected with trichina sometime in their lives.

The symptoms of the disease occur at the time of the multiplication of the worms in the intestine, and particularly while the young worms are migrating through the body. Occasionally the symptoms are such that the condition is mistakenly called typhoid fever. Often they are very severe, and in many cases death results. Fever, chills, abdominal and muscular pains, often with diarrhea and vomiting, are prominent characteristics while the worms are being distributed and lodged in the muscles. There is much pain and tenderness of the muscles, with swelling of the muscles and the overlying skin. The disease can best be avoided by eschewing the use of all pork as food. If eaten at all, pork must be thoroughly cooked to destroy the worms that may be present. (See chapter 25.)

The presence of the disease can be definitely recognized by finding the parasites in the intestinal contents at the proper stage of the disease, or by cutting out a small piece of one of the muscles and examining it with the microscope. The worms may be discovered, at the period of migration, in the blood, and at times, in the cerebrospinal fluid. The small worms may remain alive in the muscles as long as twenty years, but the symptoms of their presence largely disappear after the first few weeks or months.

TREATMENTS FOR INTESTINAL WORMS

As in all other conditions where it is necessary to administer any poisonous drugs, this should always be done under the care and immediate direction of a competent physician. In many cases, the physician only is able to determine the exact nature of the condition, and he should be consulted as to the best drug to use and the exact dosage, which will vary for different people and for children of different ages.

Very much the same general principles apply in treatment for the expulsion of most forms of intestinal worms. This treatment includes: (1) a partial or entire cessation from food for several hours before the treatment begins; (2) the administration of a dose of castor oil or some similar material to empty the bowels as completely as possible of their content; (3) the administration of the poisonous drug, or anthelmintic, which benumbs or kills the parasite; (4) the giving of a second dose of some purgative medicine to carry out mechanically the intestinal contents, including the worms.

Pork Tapeworm. 1. Partial starvation one day.

2. At night on going to bed, the patient takes a purgative, either castor oil or Epsom salts, one half to one ounce.

3. The next morning, the patient should remain in bed during the treatment, and should have careful nursing. Nothing should be eaten until the completion of the treatment. The best plan is for the physician to write out definite instructions for the treatment.

4. The most effective drug to be used for expelling the worms is *felix-mas* or *male-fern*, usually in the official form (*oleoresina aspidii*). This should not be given except under the direction of the physician, and if improperly used, is dangerous. It is usually administered not at one dose, but in several doses in rapid succession.

5. One to two hours after the drug, a second dose of purgative must be given. This should not be given too soon (that is, in less than an hour); otherwise the poisonous drug will not have time to act on the worm. Nor should it be delayed too long (more than two hours); else the poisonous drug may be absorbed and injure the patient. This second dose of purgative should *not* be castor oil or other form of oil, for that would increase the danger of absorption of the poisonous drug from the intestine. Epsom salts, an ounce of magnesium citrate, or other purgative may be used.

6. The bowel discharges now should be carefully saved in a suitable vessel, in order that the worm may be examined. It is of particular importance to determine whether or not the head of the worm has been passed. The tapeworm heads as a rule are not very much larger than the head of an ordinary pin. It is always well to wash the bowels out with an injection of warm water, to make sure that the lower bowel is entirely empty. The discharged worm should be saved and shown to the physician. If some time must elapse, it should be preserved in denatured alcohol or in a ten per cent solution of formalin.

Various other substances are used to expel the tapeworms. A common and comparatively harmless substance is pumpkin seeds. This is given in doses of from one to two ounces of the seeds prepared as follows:

Thoroughly crush the seeds, and soak twelve or fourteen hours in a very small amount of water. Beat up with egg or a little sirup before administering. The preparatory treatment and the after treatment are the same as in using any other of these remedies.

Beef Tapeworm. Same as for pork tapeworm.

Fish Tapeworm. Same as for pork tapeworm.

Dwarf Tapeworm. Same as for pork tapeworm.

Hydatid Cysts. The only treatment here is surgical.

Common Roundworm. 1. A soft or liquid diet should be given for one day.

2. At night, give one half to one ounce of castor oil or Epsom salts.

3. The next morning, give *santonin*, one grain for a child six years old, from three to five grains for an adult.

4. Three hours later another dose of salts should be taken. This course should be followed two mornings in succession and repeated after a week, if any worms or eggs are discovered. After one month, a microscopic examination of the bowel discharges should be made by the physician, to determine whether or not eggs are present. Care should be used in giving *santonin*, as it is poisonous and often produces dizziness and yellow vision.

Pinworms. These must be attacked by injections in the bowel as well as by giving medicine. The treatment by mouth is identical with that for the common roundworms. To remove the worms from the lower bowel, give rectal injections as follows:

1. Wash out the bowel with a large injection of water.

2. Then inject about a pint, or as much as can be retained, of an infusion of *quassia*. This is made by soaking one ounce of *quassia* chips in a pint of hot water for one half hour. (Do not boil.) This should be repeated for several days. Ice water or glycerin may be used for the same purpose as the infusion of *quassia*. For itching, use carbolated vaseline or menthol, five per cent in vaseline.

Whipworms. This worm is generally very difficult to dislodge. The treatment is similar to that for tapeworm, or to the treatment for hookworms, to be described in the following paragraphs. Fortunately the parasite does not commonly produce any serious symptoms; and if efforts to dislodge it are unsuccessful, they should be discontinued.

Hookworms. Two principal drugs are used in the treatment to remove hookworms from the intestine. Either method may be employed.

First Method. For adults: 1. On the day preceding the treatment, a light evening meal is eaten. This meal should not be omitted, and it should be followed by one half to one ounce of Epsom salts.

2. The next morning, a very light breakfast is taken, consisting of milk or gruel.

3. Twenty-two minims of oil of *chenopodium* are divided into three equal doses, and given in capsules, one at seven, one at eight, and one at nine o'clock in the morning.

4. Two hours after the last of these doses, another purgative dose of Epsom salts is given. The dosage for children is considerably smaller, and should be determined by the physician.

Second Method. Thymol may be used in the place of chenopodium. The dose of this for adults is 45 to 60 grains, usually divided into two doses. It should only be prescribed by the physician. In the use of this drug, great care must be exercised to avoid the swallowing of any oil shortly before or during the time the thymol is in the stomach and the bowels. Castor oil therefore should not be used. The same precaution is necessary in regard to alcohol. If these precautions are not heeded, great danger of severe poisoning from the thymol exists.

Under ordinary circumstances, neither of these procedures should be undertaken except under the supervision of a physician; but it is deemed wise to give them here in detail for the benefit of those in tropical countries who do not have easy access to well trained medical service.

Trichina. If it is discovered, within three or four days, that a person has eaten infected pork, the stomach and the bowels should be thoroughly emptied by washing out the stomach, giving purgatives to empty the intestine, and using enemas. (See chapter 10.) Various drugs may be given at this time, with the hope of removing the worms; but this should be done only under the direction of a physician.

There are no remedies that will reach the small worms in the tissues or after they have begun to migrate.

If there is any field in the whole range of the diseases of human beings, where the rules of cleanliness and the general laws of sanitation are essential and their obedience effective in preventing disease, it is the field of the intestinal parasites. This emphasizes the importance of adequate provision for the disposal of all human excreta and the universal use of proper toilets; of avoiding the use of this material for fertilizing gardens and fields where food for human beings is grown; of refraining from going barefooted in tropical climates, where the ground may be contaminated; and of scrupulous cleanliness of person, and of the greatest care to wash the hands thoroughly before eating and before handling food. Care is especially necessary in association with domestic animals, including the dog. Children are subjected to the greatest danger of infection, because of their natural carelessness, and because they come into such close contact with the floors, the ground, and animal pets. Children should be provided with clean places to play. In short, we should all learn to be as nearly absolutely cleanly as possible.

Diseases of Liver and Pancreas

CIRRHOSIS

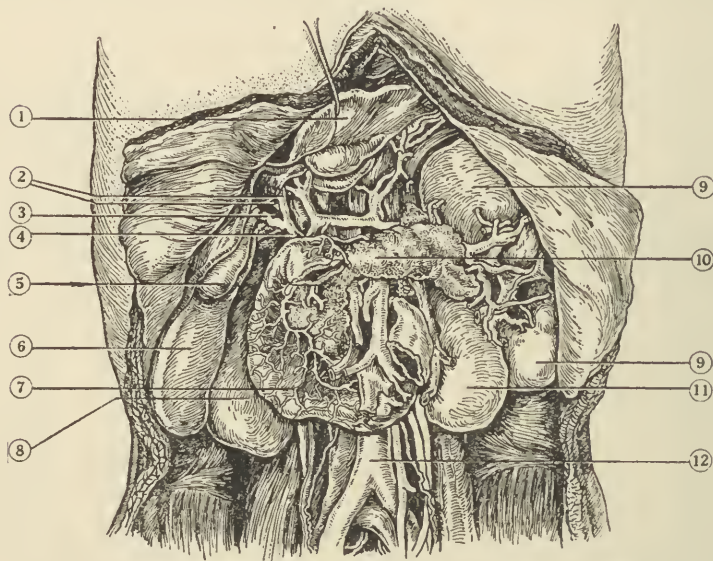
Cirrhosis is a hardening of the liver from increase in the connective tissue.

Causes: Certain poisons are known to cause it. Alcohol is the most important one; but there are many others, such as those which give the peculiar flavor to certain wines. The poisons of infectious diseases and the poison of syphilis are factors in some types. The onset of cirrhosis is very slow. In fact, the disease is usually well advanced before its typical symptoms alarm the patient sufficiently that he seeks medical advice. The liver may be either enlarged or small. If it is small, the surface may be rough, having the well-known hobnailed appearance. If enlarged, it is usually smooth.

There are two general types. In one, there is obstruction to the portal blood vessels, resulting in dropsy of the abdomen (known as ascites). In the other, the bile ducts are obstructed and a mild jaundice occurs. The former is more common, and occurs in middle life, mostly in men addicted to drink. The latter occurs in young persons. Infectious diseases play a large part in its causation. The liver is greatly enlarged. There is no dropsy, but a mild jaundice is present.

In either case, the disease may run a course of several years. The dropsy of cirrhosis is different from the general dropsy of Bright's disease or the dropsy of the legs and the lower parts of the body in heart disease. In kidney and heart disease, the fluid accumulates in the soft tissues of the body, and may be compared to a water-logging of the tissues. In hardening of the liver, the fluid accumulates in the peritoneal cavity, and is entirely out of proportion to any swelling of the feet and ankles that may be present with it. When this fluid accumulates to such an extent as to press the diaphragm upward against the heart and the lungs, it should be removed by tapping; and this may have to be done a number of times. As high as two to four gallons has been removed at a single time. Large veins are usually seen over the abdomen, especially about the navel and across the body near the diaphragm. There are also enlarged veins in the rectum (hemorrhoids), the intestines, and the stomach. Chronic disturbance of digestion occurs with cirrhosis.

Treatment: The disease is incurable, but much may be done to make the patient more comfortable. To decrease the dropsical condition, water-drinking may have to be restricted, and saline cathartics or elaterium, which produce large watery bowel movements, used more or less regularly. When these measures do not sufficiently reduce the fluid accumulation, it must be removed by



A view of the upper part of the abdominal cavity with the stomach and the greater part of the small intestine removed

- | | |
|--------------------------------------|--|
| 1. Left lobe of liver | end from its attachment to the stomach |
| 2. Hepatic ducts | 8. Right kidney |
| 3. Cystic duct — from gall bladder | 9. Spleen |
| 4. Common duct | 10. Pancreas |
| 5. Gall bladder | 11. Left kidney |
| 6. Right lobe of liver | 12. Aorta |
| 7. Duodenum — separated at its upper | |

tapping. An occasional case is benefited by an operation designed to encourage the formation of more blood vessels from the portal circulation.

JAUNDICE

This is a condition in which bile circulates in the blood and the body fluids.

Symptoms: Jaundice is manifest by the yellow color imparted to the skin and the mucous membranes and by the coloring of the urine with bile. It is most readily seen in the white of the eye. Jaundice is more than a sallow color. It shows as a distinct

yellow in the eyes and later in the skin. This may be a bright lemon color, or it may be dark, like a bronzing of the skin.

Jaundice is usually accompanied by a rather severe and often almost intolerable itching of the skin. This coloring of the skin is not a disease in itself, but an indication or symptom of some disease, most usually of an obstruction to the outflow of bile from the liver ducts into the intestine, such as the presence of a gallstone in the bile duct, or a tumor or cancer of the bile ducts or of the liver. Inflammation or tumor of the head of the pancreas may cause it, also catarrhal inflammation of the ducts. It occurs in certain forms of cirrhosis and in acute yellow atrophy of the liver. It may occur in the newborn infant, and is present in certain imperfectly understood diseases of the spleen and the liver.

If the trouble is due to obstruction to the flow of bile into the intestine, the stools will be grayish or clay-colored, because of the absence of bile coloring matter in the feces. Since the lack of bile interferes with the digestion of fats and oils, these foods must be eaten sparingly by one having obstructive jaundice. Thorough examination and laboratory tests should be made to determine the cause of the jaundice.

Treatment: The patient should drink water freely, so as to get rid of the bile by the urine. The itching is much relieved by sweating baths, as the steam, vapor, or electric light bath; also by the warm tub bath, with or without soda in the water. If very severe, a skin lotion or dusting powder may be used.

LOTION

R	
Carbolic acid, 4% solution	2 ounces
Glycerin	1 ounce
Rose water	up to 4 ounces

Directions: Rub on the skin as needed.

DUSTING POWDER

R	
Starch	1 ounce
Camphor	1½ dram
Zinc oxide	½ ounce

Directions: Dust on the skin with a powder puff.

MALIGNANT JAUNDICE, OR ACUTE YELLOW ATROPHY

This is fortunately a very rare disease. It is due to certain poisons, as chloroform or phosphorus, or to acute infections. It sometimes occurs in pregnancy, and more than half the cases are in women. Unbalanced diet, or other errors in diet, are often responsible for some special susceptibility to this ailment.

At the onset, the disease appears like an ordinary catarrhal jaundice, until the patient shows the severe symptoms of headache, delirium, twitching of muscles, or convulsions. Vomiting is constant, the jaundice deepens, and the patient becomes unconscious. The pulse is very rapid, though there is usually no fever. There is bile in the urine, and the stools are generally clay-colored. The disease is nearly always fatal, running its course in a few days to two or three weeks. There is no known means of cure or of checking the disease.

CATARRHAL JAUNDICE (CHOLANGITIS)

This is an inflammation of the bile ducts. The most common form is an acute catarrh of the duodenum which involves the large bile ducts emptying into it. The disease occurs in young people.

Symptoms: These are not usually severe. The jaundice is mild, the stools are clay-colored, and the pulse is slow, as is common with jaundice. Sometimes there is high fever, with chill, headache, and vomiting. In these cases, there may be pain or a sense of fullness in the region of the liver, though pain is usually absent. The disease runs its course in two to six weeks.

Treatment: The diet should be light, and fats much restricted. Fomentations to the abdomen, or fomentations alternating with the cold compress, probably help in relieving the liver congestion and the catarrhal condition of the ducts. An occasional dose of Epsom salts assists in emptying the bile ducts. Violent cathartics should not be used. The tepid bath with soda often relieves the itching where this is troublesome.

GALLSTONES

Gallstones may form in the bile ducts of the liver, but these are rare. They commonly form in the gall bladder as a result of some previous infection or inflammation of the gall bladder wall, as after typhoid fever. Gallstones are more common in women than in men, and more frequent in women who have borne children than in those who have not.

Symptoms: Gallstones may be present for years without causing symptoms of any kind. Some patients never have pain, but are troubled with flatulence, distress after eating, or a feeling of fullness in the region of the liver. X ray examination reveals gallstones only exceptionally, and so adds but little information in the average case.

The gall bladder may contain one or many stones, large or small, from the size of shot, many hundreds of which may be present, up to a single large stone filling the entire gall bladder.

Those the size of peas or beans or of large hazelnuts are very common. The presence of these stones in the gall bladder may give rise to pain, but this is never so severe as the pain caused by the passing of stones down the bile duct to the intestine. In such case, the pain is excruciating, and nearly always requires morphine to relieve it. In addition to the pain, the patient breaks out into a profuse perspiration with each paroxysm of pain. These attacks last a few seconds or minutes, and recur frequently for hours or days. There may also be vomiting. If there is accompanying inflammation of the gall bladder or ducts, there may

be chills and fever with the attack. When the stone passes into the common bile duct, jaundice will occur if it blocks the duct.

Treatment: Fomentations (very large and very hot) are helpful in relieving the pain. Medicines are of no avail, except morphine for pain. Olive oil taken freely, especially if followed by the use of some saline cathartic, is likely to form little masses of soap, which are not unlike gallstones when passed by bowel. This trick is a common one with impostors who pretend to cure gallstones without operation. There is no medicine that will dissolve gallstones. The long continued irritation and inflammation



Gallstones in the Gall Bladder, as Revealed by the X Ray

of the gall bladder from the presence of stones results in cancer in two or three per cent of cases. Where small stones are present, attacks of gallstone colic may recur for years.

The only means of removing gallstones is by operation. The diseased gall bladder wall being the chief cause of the formation of stones, the gall bladder itself also must usually be removed. The risk in modern surgery for gallstones is very little, much less than the invalidism and dangers of their continued presence.

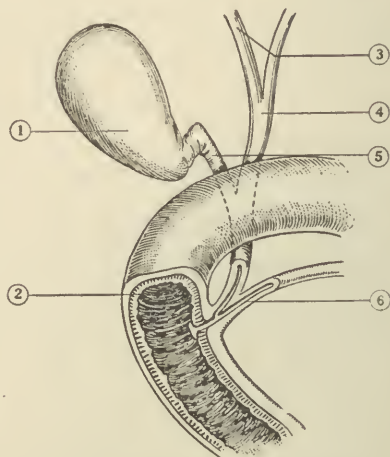
INFLAMMATION OF THE GALL BLADDER (CHOLECYSTITIS)

An acute infection of the gall bladder may result from focal infections, typhoid fever, pneumonia, *et cetera*, and the presence

of gallstones. Appendicitis is frequent in association with an inflamed gall bladder. The disease may be catarrhal in nature, or the gall bladder may fill with pus where the outlet becomes closed from swelling or by gallstones. The gall bladder wall may be greatly thickened and inflamed, especially in chronic cases and where stones are present.

Symptoms: The onset is often sudden, with severe pain in the region of the liver. There is rapid pulse, fever, nausea, and vomiting. The abdomen is rigid, and tender to pressure at the edge of the ribs on the right side. This point of tenderness may be as low as the level of the navel, and in some cases, even over the appendix, thus leading to confusion with acute appendicitis. In case of an abscess of the gall bladder, there may be "chills and fever," thus simulating malaria. However, a careful physical examination and a blood count quickly show the true nature of the illness.

Treatment: The milder catarrhal forms yield to simple treatment by fomentations, free water-drinking, and a dose of salts. In more severe cases, the fomentations (rarely the ice bag) give much relief; but only prompt surgery will cure the disease or save the patient's life.



GALL BLADDER AND BILE DUCTS

1. Gall bladder
2. Duodenum—front half of wall cut away
3. Hepatic ducts coming from liver
4. Common bile duct
5. Duct of the gall bladder
6. Duct of the pancreas

CONGESTION

After each meal, there is a brief, active congestion of the liver. In the case of continued overeating, and with those who use alcoholics, this may in time cause considerable disturbance. Passive congestion of the liver is present in chronic valvular disease of the heart, and in conditions which hinder the flow of blood through the lungs, as emphysema and fibrous pneumonia. The liver may be very large under such conditions.

The treatment is that of the disease or condition causing the congestion. The hot foot bath, with fomentations over the liver,

followed by a cold mitten friction, is helpful in relieving liver congestion.

BILIOUSNESS

The common terms "sluggish liver" and "biliousness" are often used to describe attacks of constipation with headache, nausea, and vomiting. These symptoms are usually attributable to acute indigestion and constipation, and have little to do with disordered liver function. They may be caused by indiscretions in diet, such as the overuse of sweets, rich pastry, fried food, and condiments, and also by the continued use of coffee, tea, and much meat. Lack of outdoor exercise and the frequent use of cathartics, especially of calomel, seem to predispose greatly to such attacks. The liver is only secondarily involved. The vomiting of bile is not evidence of disturbance of the liver, but is produced by severe and prolonged vomiting, which brings up the contents of the first part of the small intestine.

Prolonged and severe headaches, especially in women, often result in nausea and the vomiting of bile. These attacks are commonly called sick headaches; and in many instances, they are in some way associated with the menses, and recur with more or less regularity. In this case, they have nothing to do with the liver or indigestion, and may be relieved by the regular and persistent use of corpus luteum (a form of ovarian extract) taken in five-grain doses three times a day for ten days or two weeks before each period.

OTHER DISEASES OF THE LIVER

Cancer. Cancer of the liver is very common as a secondary manifestation of cancer in other organs, as the gall bladder, the stomach, the pancreas, the intestines, the breast, or the generative organs. It is usually a late and of course incurable condition. *The symptoms* are indefinite and generally a part of the disturbance from the primary cancer. There may be only indigestion with loss of weight and strength. Anæmia is very evident. Pain may be absent or slight. Jaundice is occasionally present and slight, but is often absent altogether.

Abscesses. Abscesses of the liver may occur in general septic poisoning (blood poisoning), usually with abscesses in other parts. *The symptoms* are fever of a very irregular type. The patient is profoundly ill and the outlook is grave. The disease is only a part of a pus infection elsewhere; and if anything can be done, it is by the treatment of the original source of infection, if this can be found. (See chapter 76.)

Tropical Abscess. This disease is the direct result of amœbic dysentery, and though more frequent in China, India, and other

tropical countries where sanitation is generally disregarded, yet it is not uncommon in the United States. It produces a single very large abscess, destroying much liver tissue, sometimes so much that the liver is only a sac filled with pus. The patient may have irregular fever with drenching sweats and much prostration, or the abscess may produce but few symptoms. Sometimes it ruptures into the lung, and there is sudden coughing up of a large quantity of pus appearing like anchovy sauce. Careful examination is necessary, in many cases, to determine the presence of liver abscess, and frequently only tapping the liver will reveal it. The treatment is entirely surgical and is usually very satisfactory.

DISEASES OF THE PANCREAS

Acute Pancreatitis. The term "acute pancreatitis" indicates an inflammation of the pancreas which results from the destruction of pancreatic tissues by digestive juices; in other words, autodigestion. The systemic manifestations of the disease are largely due to the absorption of poisons from the broken-down cells—by-products of autodigestion.

Symptoms: The condition is usually mistaken for intestinal obstruction, or perforated ulcer of the stomach or duodenum, and consequently must partake of the symptoms peculiar to these accidents. The attack begins suddenly with intense pain in the upper abdomen. It may resemble gallstone colic. Vomiting follows; and if the condition progresses unfavorably, peritonitis will develop.

Cause: The disease is supposed to be due to some mechanical abnormality usually associated with disease of the bile passages and gall bladder, that allows for the transportation of infected bile back into the pancreas, or the activation of the normal proteolytic enzyme prepared by the pancreas.

Treatment: Allay vomiting by stomach lavage. Empty the intestine by means of copious enemas. Use no cathartics unless advised by a physician. Withdraw all food. Allay pain by the use of fomentations. A physician should be called, by all means, as surgical interference may be the sole means of preventing serious complications.

Chronic Pancreatitis. A chronic inflammation of the pancreas is not infrequently caused by alcoholism, syphilis, tuberculosis, gallstones, pancreatic calculi, or stones, cancer of the pancreas, and ulcer of the stomach and duodenum.

Symptoms: Chronic dyspepsia, emaciation, general debility, possibly sugar in the urine, and in a large percentage of cases, pain similar to that caused by gallstone colic or duodenal ulcer.

Treatment: The only help lies in the removal of the cause. Dietary care is beneficial; and in incurable cases, much can be done in this respect to make the patient more comfortable. A stool examination is necessary to aid in the establishment of a dietary *régime*.

Cancer of the Pancreas. Next to acute pancreatitis, cancer is the most common disease of the gland. One half of one per cent of all deaths from cancer are due to the involvement of the pancreas. It is incurable, of course, because recognition is always too late.

Symptoms: Digestive disturbances, varied in nature, and which are not at all distinct; loss of appetite; loss of weight; discomfort in the upper abdomen which may on occasion amount to actual severe pain. Jaundice is the most striking symptom. It may come on gradually or suddenly, and is permanent and progressive.

Section VII—The Circulatory System

CHAPTER 32

Physiology of Circulation

CELLS

The body is built up of minute structures called cells. The average typical cell is about $1/2500$ of an inch in diameter. These tiny structures have life, and, as is characteristic of all life, take in nourishment and throw out waste. Most of these cells are a long way from the source of food supply; they are required to remain stationary, being built up into bone, muscle, and brain. Nourishment must therefore be carried to them, and their needs in other respects must be supplied by some medium capable of circulating among them. To the blood has been delegated this important activity. The blood receives its supply of nourishment from the digestive organs, and distributes it to hungry cells. From the cell, it receives the waste of wear and tear.

ELEMENTS OF THE BLOOD

The cell must breathe; so little bodies called red corpuscles, conveyed by the blood, carry to it the needed oxygen from the lungs, and just as gladly do they receive the gaseous residue for return to the lungs. This residue is carbonic acid gas. It is precisely the same material that is formed when a candle is burned. The oxygen of the air unites with carbon to form carbon dioxide. The oxygen derived from the blood combines with elements in the cell in just the same way, and forms the same product.

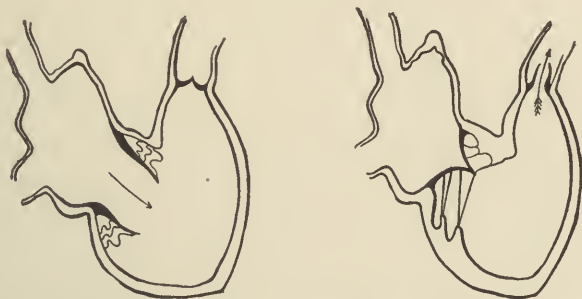
The blood also assists in uniting the activities of the various members of the body by transporting chemical substances formed by some organ to distant parts. For example, certain glands, known as the glands of internal secretion, pour their product into the blood stream; and by it, the chemical substance is carried to every part of the body, stimulating many tissues to increased activity. One organ may thus exert a controlling influence over the work of other organs.

This wonderful stream furthermore contains the so-called policemen of the body,—the active little organisms known as white corpuscles, which rush to the defense of a cell when germs of disease attack it.

The bathing of each individual cell with this life-sustaining fluid is accomplished through one of the marvels of creation,—the circulation, the irrigation system of the body. (See color section, page 32.)

THE HEART

This system requires a pump, a mechanism capable of receiving blood and again discharging it with sufficient force to insure its final return through the closed system of elastic tubing. The heart serves this purpose. It is in appearance a pear-shaped organ, with muscular walls, about the size of one's fist, and divided within into four cavities, or chambers. Two relatively small, thin-walled cavities at the upper part receive the blood



Check valves of the heart. By a wonderful arrangement of muscles, the valves are opened and closed.

from vessels called veins; and two larger, thick-walled cavities below drive the blood into vessels communicating with them and known as arteries. The upper chambers function as feed pumps, emptying their contents at regular intervals into the cavities below, which serve the circulatory system as force pumps.

Venous or impure blood enters one of these upper chambers, the right auricle, through two great veins, the superior and inferior venæ cavæ; the former returning blood from the part of the body above the heart, and the latter from below its level. This chamber is the feed pump for the larger, thick-walled cavity below it, the right ventricle. A valve separates the two cavities, and is so constructed that it will allow a flow of blood from the auricle into the ventricle, but it will not allow blood to pass back from the ventricle into the auricle. The pulmonary artery rises from this ventricle, and conveys the venous blood driven into it, to the lungs for aëration. This opening also is guarded by a valve. It is so arranged that pressure from within the

cavity will cause it to open and thus allow the ventricle to empty itself; but as soon as its muscular walls relax, the valve closes tightly, and prevents a return of the blood to the chamber. Thus when the heart contracts, the right auricle will first empty its contents into the right ventricle; and the ventricle, with its heavy muscular wall, will then contract forcibly on the inclosed blood. There is no escape back into the auricle; the valve will not give way. Soon the valve of the only remaining outlet opens, and the blood is hurried into the lungs with sufficient force and velocity to traverse its maze of tiny passages, and to return ultimately to the left side of the heart. It is now arterial blood, clean, and charged with the necessary oxygen. The gaseous waste collected from the tissues has been cast off, oxygen has been taken on, and it is returned to the heart, fitted to be sent on its mission as a life-sustaining agency. (See color section, page 31.)

The return of the blood from the lungs to the left side of the heart, has been made through four veins,—the pulmonary veins. They empty into the left auricle. This cavity acts in a capacity similar to that of the right auricle—as a reservoir. It is the feed pump to the left ventricle, with which it communicates through an opening guarded by a valve that will not allow a back flow into the auricle. This ventricle has heavy muscular walls, heavier even than those of the right ventricle. The reason for this is seen in the work required of the respective chambers. The right ventricle has but to force the blood through the pulmonary circulation, the lungs, whereas the left ventricle is required to pump it to head, finger, and toe—the propelling force of the general circulation. It contracts simultaneously with the ventricle to its right, and the rising pressure within its confining walls forces open a valve guarding the entrance to the aorta.

The aorta is the largest division of the great arterial tree. From it branches are distributed to every organ and tissue of the body. When the contraction of the ventricle has spent its energy and emptied its contents into this great trunk of the vascular system, the aortic valve closes, and thus prevents a back flow into the relaxed chamber.

Why the Heart Beats. Some of the blood that is pumped by the heart, also circulates through the heart muscle, furnishing necessary nourishment, and removing waste, the same as in other tissues. It also carries salts of calcium, sodium, and potassium, which play an important rôle in causing the muscle cells to contract and relax rhythmically. If the blood contains too

much calcium, the heart muscle may go into rigor; that is, it will contract, but will not relax. If too much sodium and potassium are present, it will relax and refuse to function. The correct proportion of all these salts, however, will interact with the muscle cell in such a way as to bring about alternate contraction and relaxation. Thus a frog or turtle heart may be removed from the body and kept in activity for days, if provision is made for proper circulation of solutions containing these salts.

The most irritable part of the heart is found to be localized in a small area in the wall of the right auricle. This point recovers from the depletion incident to a single contraction, before any other part has completely regained its full capacity, and it is consequently the first point ready for a succeeding contraction. By reason of this fact, it sets the pace for the rest of the heart, and is known as the "pacemaker." The impulse originating the contraction starts here, and travels by muscle cells to the two auricles, and by way of a specialized pathway to the two ventricles. The auricles contract first, and simultaneous contraction of the two ventricles follows.

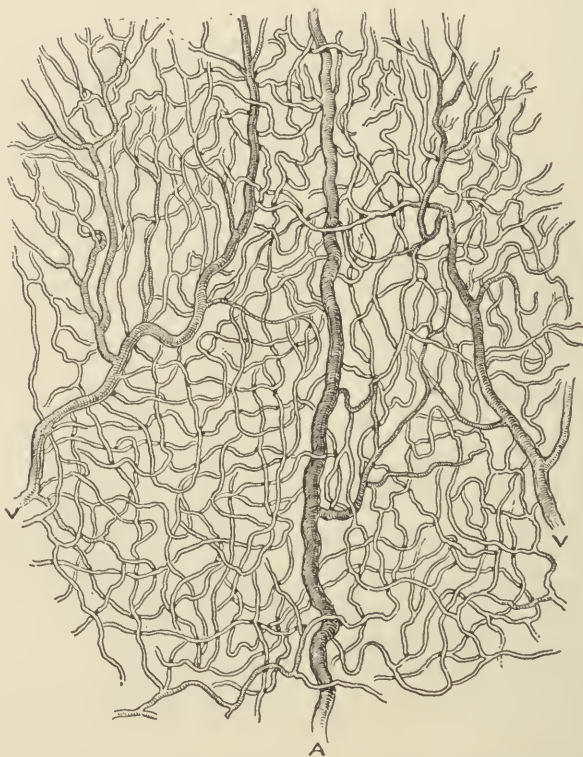
Although the heart may pulsate even after removal from the body, thus showing its absolute independence and automatic action, yet the Creator intended that it should be under the control of the brain. This is consummated through a complex system of nerve cells and fibers. Through nerve fibers sent to the "pacemaker," the number of beats each minute is governed. The rate may be increased or decreased according to the needs of the body. At one time, it may be "whipped up" to one hundred twenty beats a minute; at another, slowed down to forty. When we are engaged in our ordinary duties, the heart averages about seventy beats a minute.

There are other nerve fibers which, by reason of their connection with the pathway between the "pacemaker" and the ventricles, may hasten or retard the transfer of the impulse. Indeed, so powerful is the control of the brain over this mechanism, that an impulse from the "pacemaker" may be entirely blocked in transit. In such a case, the auricles would contract, but the ventricles would not follow suit.

When the heart beats at the rate of seventy a minute, it obtains a rest of four tenths of a second after each beat. When it is hurried, this rest period is shortened.

In order that the flow of blood may be continued during this period of rest, a certain amount of energy is stored in the blood vessel wall when the heart contracts. In fact, more energy is stored than is immediately converted into "push." The walls of the larger arteries are made up almost entirely of elastic tissue.

Consequently, when the system is suddenly overfilled by the injection into it of an eighth of a pint of blood by contraction of the heart, the walls, especially of the aorta, are greatly stretched. They will therefore exert a gradually diminishing pressure on



A capillary network, greatly magnified. A, small artery feeding the capillaries; V, V, veins carrying blood back from the capillaries.

the contained blood during the time that the heart is resting. Thus the energy that is stored at the time of contraction, is utilized between beats to sustain the circulation.

THE ARTERIAL TREE

The aorta is the great main artery from which blood is supplied to every part of the body. From its origin in the left ventricle, it passes up under the breastbone, arches over from right to left, and descends through the chest a little to the left

of the middle. It pierces the diaphragm — the sheet of muscle that helps us to breathe, and by reason of its location, separates the chest from the cavity in which are found the stomach, the intestines, and the liver — and, passing well down into this cavity, divides into branches, which are distributed to the lower limbs. It is a large vessel. At its origin, it is one and an eighth inches in diameter; at the point where it divides and ceases to be known as the aorta, it is seven tenths of an inch in diameter. The many branches given off from it divide and subdivide, each division being smaller than its parent, until the smallest branch is formed — the capillary.

This minute division is about one thirty-five hundredth of an inch in diameter — so small that blood corpuscles must pass through it in single file — and its wall is so thin that blood cells, oxygen, and food can readily pass out into the fluid filling the spaces between the tissue cells, and waste can as readily enter the blood from the same depots. If a cross section of all the capillaries of the body were taken, it would make an area between seven hundred and eight hundred times that of the aorta at its origin, about seven hundred or eight hundred square inches. Evidently, therefore, the capillary distribution is very extensive. Within this great area, the work of the blood is done. Here it is changed from pure, arterial blood to impure, venous blood.

The capillaries empty their contents into minute veins, which unite with others, forming larger veins; and these, in their passage toward the heart, continue to increase in size as they receive tributaries along the way, until ultimately the great trunks of the superior and inferior venæ cavæ are reached, through which venous blood passes on its way to the right auricle.

For the maintenance of a circulation through such a circuit as this, the liberation of considerable energy is required. The resistance offered to the flow of blood through arteries and veins is responsible for the production of a lateral pressure in the medium-sized arteries of between one hundred and one hundred forty millimeters of mercury, in the normal individual. In other words, the pressure in one of these arteries is sufficient to support a column of mercury about four or five inches in height. When the heart contracts, it forces blood into the arterial tree with sufficient force to overcome this resistance and to impart a velocity that will carry it through the arteries, the capillaries, the veins, and back to the right side of the heart.

A mechanism has been arranged whereby the quantity of blood brought to a given part of the body may be increased or decreased, according to the need. For example, after a meal, more blood is needed in the digestive organs; during heavy mus-

cular activity, the bulk of the blood is needed in the muscles, to supply them with an abundance of nourishment, and to prevent the accumulation of fatigue poisons. When the weather is hot, the blood is directed into the skin, in order that heat may be abstracted, and the body thus kept cool. In cold weather, the vessels of the skin contain less blood. This change is possible because the construction of the walls of the smaller arteries allows for an increase or a decrease in the size of the vessel. It has in its wall a varying amount of circular muscle, which, when it contracts, decreases the size of the artery. When it relaxes, the artery is capable of holding more blood. The nerve fibers sent to this muscular tissue carry impulses from the brain which control its activity. When more blood is needed in the digestive tract, impulses are sent out that cause a contraction of arteries everywhere else, with the result that the major circulation is directed through these parts.

The flow of blood is greatly facilitated by muscular movement. When a muscle is contracted, venous blood is pressed along on its way to the heart. It can move in one direction only; for the veins are supplied with valves scattered at frequent intervals, which open toward the heart, and prevent back flow. The movements of respiration also quicken the circulation; for on inspiration, the pressure within the abdomen is increased, aiding in forcing blood along, while a negative pressure is produced within the chest, which draws by suction.

THE PULSE

That which is recognized as the pulse is an alternate expansion and contraction of the arteries. As has already been noted, the arteries expand to accommodate the volume of blood pumped into them at each contraction of the heart. During the resting period, they gradually contract again, as the volume of blood contained is forced through the capillaries and into the veins. Each heartbeat, then, is betrayed externally, by the pulse.

The pulse may be taken in the wrist, the radial artery being felt as it passes over bony eminences, on the thumb side. The temporal artery as it passes through the hollow space just in front of the ear, offers another site for easily obtaining the pulse. The carotid artery may be felt in the neck, at a point a little below the angle of the jaw, and just in front of the border of the muscle passing up from the collar bone.

Diseases of the Heart

Among the causes of death, heart disease ranks highest. In recent years, serious attention has been attracted to it because of the statistical evidence that deaths from this cause are constantly increasing. Inquiry into the causes of the various kinds of heart disease shows some of them to be infectious and accidental, and others largely cultivated through wrong habits of living. The natural conclusion is, then, that heart disease is, to some extent at least, among the preventable diseases. If this is true, then a knowledge of the cause and character and course of the several kinds of heart disease should be of value and interest to the layman. But for him to undertake to diagnose and treat a suspected case would be neither wise nor safe.

According to their cause and nature, all heart troubles fall into some one of four big groups; namely: (1) the rheumatic group; (2) the syphilitic group; (3) the arteriosclerotic and high-blood-pressure group; (4) the functional group.

This classification does not include the diseases of the heart that are present at birth, as they are rare, and a discussion of them would be of no practical value.

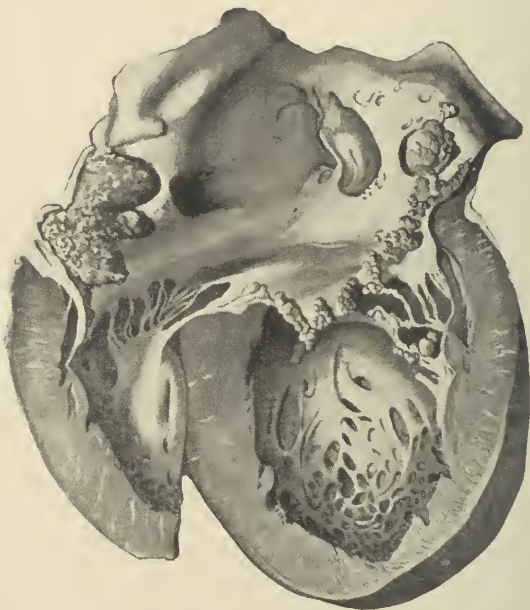
I. RHEUMATIC GROUP

This is not a satisfactory term, as the word "rheumatism" is used to mean so many different things; but for the lack of a better term, it will be used here, because acute rheumatism, or rheumatic fever, is so well known, and is generally understood to be often associated with heart disease. But only in the sense of an acute infectious process will it be used. The germ causing rheumatism is of the streptococcic class, and causes the following diseases: (1) tonsillitis; (2) acute rheumatism; (3) inflammations about the heart, as (*a*) *endocarditis*, or inflammation of the inner lining of the heart, usually confined to the valves, (*b*) *pericarditis*, or inflammation of the coverings of the heart, and also, rarely (*c*) *myocarditis*, in which the muscle of the heart is involved; (4) chorea, sometimes called St. Vitus's dance (see chapter 39), in which the infection is in the brain.

As to the last, there may be some question. However, very eminent and reliable investigators claim to have isolated the streptococcus from the brain tissues of children dead of chorea. At all events, these four diseases are evidently closely related, and all are likely to leave their permanent imprint on the valves

of the heart, and thus may be a serious physical handicap to the patient through the after years. So, for our purposes, their import is the same. In this group may also be included the endocarditis that occasionally occurs in the other acute infectious fevers, especially scarlet fever and pneumonia.

After Effects. By far the most important thing about this entire group is the effect left on the valves of the heart, which involvement may be entirely unnoticed at the time, even by the physician. This possibility should be borne in mind in all such diseases, and actually suspected in the presence of acute rheumatism, which is the cause of more than one third of all organic heart trouble. The greater portion of the real organic valvular diseases are from this rheumatic group of causes, and obviously they have their beginning in childhood and youth, usually before the age of twenty-one. They are also more common in women.



From MacCallum's "Pathology"

Warty Growth on Puckered Valve Edges, Due to Acute Rheumatism of the Heart

As the inflammation in the thin leaves of membrane constituting the valves subsides and the ulcerations heal, two permanent defects may result: one a narrowing of the opening, caused by the scar formation with contraction; and the other an imperfect closing of the valves, because of the deformity. The blood is thus prevented, by the narrowing of the orifice, from flowing freely and unobstructedly in the direction it should go, and is then permitted to flow back in the wrong direction, because of the imperfectly closed valves. The former defect is called *stenosis*, and the latter *incompetency*.

The presence of these defects may not be recognized until later in life, when the heart may give evidence of them through symptoms of a failing heart muscle.

II. THE SYPHILITIC GROUP

Syphilis, which causes about twelve per cent of the organic heart troubles, does not generally attack the heart itself, but beginning in the arch of the aorta, it extends back to the aortic valves, which it renders incompetent by partial destruction. In consequence of this, the blood is permitted, during the period of relaxation of the heart (diastole), to flow freely back into the left chamber of the heart. This becomes greatly enlarged, and in the course of time, fails under the load and finally gives up the struggle.

Syphilitic heart trouble is a disease of middle life, usually past thirty-five, and is more common in men than in women, because syphilitic infection is more common in men.

III. ARTERIOSCLEROTIC AND HIGH-BLOOD-PRESSURE GROUP

To this group belong most of the heart troubles of later life. The situation among these is that the amount of work thrown upon the heart, during rest as well as during exertion, is gradually increasing, while the heart muscle is gradually deteriorating, and its capacity for work correspondingly diminishing. There may be no symptoms noticeable to the patient until these two factors meet, so to speak, at which point the heart has barely enough functional capacity to maintain the circulation with the body at rest, and any extra exertion will produce symptoms of insufficiency of the heart muscle. (For symptoms, see under dilatation of the heart, pages 362, 363.)

Causes for the increased amount of work are several,—hardening of the arteries (arteriosclerosis), chronic kidney disease, and high blood pressure from any cause. Many of the patients of this group may not show high blood pressure, or any other condition that would materially increase the work of the heart. The chief progressive factor is one that causes weakness of the heart muscle, such as a degenerative process in the heart muscle itself; or a hardening of the coronary arteries, which supply the heart with blood, resulting, according to some, in a disease called *angina pectoris*; or fatty heart. In this last, there is a deposit of fat among the muscle fibers and about the heart, usually associated with obesity; or a degeneration, with blocking of the tracts over which the nerve impulses pass to the muscle fibers.

In this group, the valves are not necessarily involved, the heart muscle being primarily at fault. As a rule, the condition does not manifest itself until middle life, although the causes have, in all probability, been in operation for years previous.

Practically, the causes of this group are the same as the causes of arteriosclerosis, chronic kidney disease, and high blood pressure, such as: long continued irritation from such poisons as alcohol, tobacco, and caffeine; syphilis and possibly other infections; worry and the high-tension life; and lastly, the greatest of them all, overeating.

IV. FUNCTIONAL GROUP

Among these, we have disturbances in the function of the heart, without organic change or disease in the organ. Most common among these is palpitation, in which there is a more or less rapid and forcible action of the heart, that is perceptible to the patient, and causes him considerable anxiety, difficulty in breathing, and at times, distress around the heart. It is evidently due to toxins or poisons taken into the body or formed in the body, in the intestinal tract, presumably; or to reflex irritation from other parts of the body. Mental excitement, depression or emotion, tea, coffee, tobacco, alcohol, dyspepsia and indigestion, spastic constipation, disturbances of the pelvic organs, and many other causes might be enumerated. The attack may last from a few minutes to several hours, and the patient may become very nervous and greatly distressed in mind; but the condition is free from real danger to life. Rapid heart (tachycardia) is very similar to palpitation in its cause and significance.

Singularly, most of the disturbances that the patient himself observes about the heart, have really no reference to the heart, but are symptoms of other troubles, and their true interpretation will need to be made by a physician. Consequently, the great majority of persons coming to a physician complaining of heart disease do not have heart disease.

Other functional troubles are the weak hearts that follow acute fevers and prolonged illnesses. The heart weakness so often following influenza probably belongs in this group.

Dilatation of the heart, so-called enlargement of the heart, and broken compensation, all refer to much the same condition; and this is the condition reached sooner or later in many of the grave organic heart troubles, whether from the valve defects caused by rheumatism and syphilis, or the strained heart resulting from high blood pressure. Among them all, and in every case, it is the muscle that must bear the added burden, and it is the muscle that finally breaks.

Symptoms: As this point is approached, the real symptoms of heart disease appear. At first, these may not seem to be related to the heart. Shortness of breath on slight exertion is one of the first. Distress and fullness after eating is very common. In fact, the patient frequently comes to the physician to be treated for stomach trouble, not suspecting his heart. In passing, it may be said that a person past middle life and never having had stomach trouble, who now finds that he has very definite and constant symptoms referable to his stomach, may find that he has one of two serious diseases, heart disease or cancer of the stomach—which means that a good physician should be consulted. Other early symptoms which patients often complain of, are a vague, restless ache in the legs and the hips, with weakness and lack of endurance in the legs particularly; palpitation of the heart, with fullness in the chest, and dry cough; dull pain and soreness in the region of the liver and also over the heart. Swelling of the ankles may be one of the first symptoms noticed, and be present a long time before any more pronounced appear. It is usually worse in the evening, and disappears during the night, while the patient is recumbent. He finds also that he needs two or more pillows to enable him to rest comfortably.

As the heart muscle fails more and more, the symptoms named become more marked. The weakness especially increases until the patient finds himself utterly exhausted on the slightest exertion. His legs become dropsical, and his breathing more difficult, so that he cannot lie down. Pains develop through the chest and the back. He is restless and sleepless, and at last it is possible to convince him that he is sick and ought to go to bed.

PROBABLE OUTCOME (PROGNOSIS) OF VARIOUS TYPES OF HEART TROUBLE

The functional troubles, not being caused by organic disease of the heart, are practically free from danger to life. Some of them being symptoms of diseases unrelated to the heart, their prognosis is a matter concerning the other diseases.

Of the other three types of heart disease, the rheumatic group presents the best prognosis. If, after the patient has recovered from the endocarditis resulting from rheumatism or tonsillitis, the heart muscle is found to be doing its work easily, and if the patient will always live within the limits of his heart power, his valvular disease will not shorten his life.

The syphilitic group has the worst prognosis. According to some authorities, most of these cases do not live beyond two years after first coming under observation. So the man who learns that of a certainty he has syphilitic heart disease should set his

house in order, and prepare to make the extreme sacrifice required of many of those who fain would worship at the shrines of Venus, Bacchus, and Selene.

Of the arteriosclerotic and high-blood-pressure class in general, it may be said that the younger the person in whom we find any of the conditions mentioned in this group, the worse the outlook; and the greater the age at which they appear, naturally, the less serious the prognosis. The more the kidneys are involved, the worse the prospect. Irregularities in the way of dropped beats or extra beats are not of great significance, although patients are often much concerned about their hearts when they discover such. The same may be said of nearly all the heart symptoms the patient himself ordinarily notices, especially if he is of a nervous temperament.

Prognosis also depends upon a person's intelligence, and his willingness to do as he is told and to live within his limitations as regards work and sudden exertion, and upon his self-discipline in controlling appetite for food as well as for alcoholic drinks. This coöperation on the part of the patient, however, is often difficult to get; and if the assertion made by some one, that "man does not die, he kills himself," is true, it is particularly true in many cases of heart disease.

TREATMENT

Every patient with acute heart disease should be under the constant care of a competent physician.¹ Patients with chronic trouble should be seen often, that the ever possible occurrence of dilatation or of failure to counterbalance defects may be prevented.

Prevention is the most rational and fruitful field, from the layman's standpoint. In considering the cause of the rheumatic group, we should first give attention to the diet of our children, especially to insist on boiled instead of raw milk if there is any question as to its source; for tonsillitis and streptococcic sore throat, even in epidemic form, may come from infected milk, as has been definitely proved. If, in spite of every precaution, a child is subject to repeated attacks of tonsillitis, the tonsils should be removed, as they are doubtless the door through which the germs get into the blood stream. Once there, they set up rheumatism and endocarditis, and possibly also chorea.

If a child or an older person gets rheumatism, prevention of the heart complication is more important than relief from pain

¹ Some persons may think it superfluous to specify that the physician should be competent; but there are so many incompetents, quacks, and would-be physicians of every brand, mostly with but little premedical and less medical training, abroad in the land, advertising and masquerading under the appellation "doctor," that the qualifying term does not seem out of place.

in the joints and from the fever. Absolute rest in bed during the course of the disease and for some time afterwards cannot be too strongly urged.

The eradication of the cause of the syphilitic group is a discouraging undertaking. Let him attempt it who will. However, one having acquired syphilis can quite probably prevent the heart affection by submitting himself at once for specific anti-syphilitic treatment.

By reference to the causes of the arteriosclerotic and high-blood-pressure group, the preventive treatment is at once suggested. It would be well to refer to the full discussion of these several causes under their respective heads. (See chapter 34.)

One should understand that in dealing with chronic heart disease, it is not so much a matter of treatment and cure as it is a matter of prudent living, with due regard to the limited capabilities of the crippled heart.

If a person is careful not to bring on dilatation of the heart, and if he works and eats temperately, keeping well within the limits of his heart power, his heart muscle will gradually increase in strength.

The fallacy of habitually taking heart tonics and stimulants is obvious. Their indiscriminate use only serves to increase the likelihood of dilatation, and make the breakdown, when it comes, more complete and more difficult to relieve. In any form of heart disease, about the only medicine a patient should take on his own initiative is Epsom salts.

As the symptoms of dilatation appear, the essential thing to do is to diminish in every way possible the work of the heart. There should be absolute rest of muscle, mind, and stomach. The bowels should be relieved, and the diet and liquids restricted, a little skimmed milk or buttermilk, vegetable broth, dry toast, or crackers being sufficient for a time.

Those who have badly degenerated heart muscle, and particularly those with angina pectoris,—a heart condition in which exertion brings on a severe pain in chest, shoulders, arms, or abdomen,—should get up slowly in the morning, and refrain from walking soon after meals or in the forenoon or against a cold wind. Such food should be chosen as will not cause gas and indigestion. The patient should guard against emotional states, especially anger.

The weakened condition of the heart muscle following operations, typhoid, influenza, and other acute infections, should receive consideration, overexertion being avoided for some time afterwards, until the heart regains its strength.

Hydrotherapy. Patients with a moderate degree of heart weakness from any cause are benefited by the alternate hot and cold leg bath, also by the salt glow followed by a neutral tub bath or shower. The cold friction is helpful. (See chapter 10.) In palpitation, the cold compress over the heart will do no harm and may have a quieting effect. In older persons who may be troubled with the pains of angina pectoris, the fomentation or hot compress will probably give better results than the cold compress. For the nervousness and distress experienced in dilatation of the heart, apply the fomentation to the back and the cold compress over the heart at the same time. This often gives great relief. In patients without dropsy or dilatation, gentle exercise is not to be forbidden.

Such drugs as digitalis, morphine, amyl nitrite, and nitroglycerin are of great value in certain emergencies and to tide the patient over difficult places, but they should be used only when explicitly ordered by a physician. The practice of some patients in using these drugs, and more commonly strychnine, on their own responsibility, is unwise and actually dangerous. As a remedy in any form of cardiac or circulatory failure, strychnine has been abandoned by many of the best physicians. Some medical authorities regard it as always harmful.

Avoid Worry. An ideal state for a heart case is one in which the patient is intelligent in regard to his condition, and at the same time free from worry about himself. The constant terror of some persons is that they may drop dead any minute. As a matter of fact, in but one or two kinds of heart trouble is sudden death likely to occur, and they are not common. It is a singular thing that those who have these conditions are never found worrying about them, and those who do worry either have no heart disease at all or else have such as never causes sudden death.

Diseases of Arteries and Veins

HIGH BLOOD PRESSURE AND HARDENING OF THE ARTERIES (ARTERIOSCLEROSIS)

Either of these conditions may exist without the other, but they are often found together. Hardening of the arteries is an accompaniment of old age; and some one has well said that "a man is as old as his arteries." The span of life depends very largely upon the elasticity and resiliency of the blood vessels. The earlier in life this hardening process appears, the shorter will be life's span. Moderate rise in blood pressure and gradual hardening of the arteries may go on together so slowly that they are not noticeable until the age of sixty or seventy years. High blood pressure may occur early in life, and later cause premature arteriosclerosis. The normal blood pressure is 120 to 130 mm. of mercury. In many individuals, this rises gradually from 140 to 160 beyond middle life. Such change at fifty-five to seventy years of age need not be considered abnormal nor as requiring special treatment; but this same pressure in a man of thirty indicates the need of definite and persistent care.

Causes: There are many causes of high blood pressure. Overeating is one of the most frequent, resulting later in hardening of the arteries. One may not necessarily eat harmful foods; persistent overeating of wholesome foods will finally result in high blood pressure. However, overeating of simple, natural foods is not common, as these foods have no stimulating qualities. It is those who indulge in meats and rich and highly spiced foods who are likely to overeat. This may be made still worse by the use of tobacco and alcoholic liquors. Stimulants call for narcotics, and narcotics pave the way for the further use of stimulants. Gouty individuals always show high blood pressure, and sooner or later, hard arteries. The use of meat and tea and coffee bears a very definite relation to high blood pressure. The stress and strain of modern life, both social and business, are large factors in producing this condition. The effects are very likely to appear at the age of forty or fifty years. Physical overwork may have the same effect as excessive nerve strain.

Chronic poisoning with alcohol, lead, or tobacco, results in hard arteries and high blood pressure. The acute infections, such as tonsillitis, scarlet fever, and typhoid fever, sometimes lead to Bright's disease, with high blood pressure and hard

arteries. Syphilis is one of the prominent causes of hardening of the arteries, with frequent accompanying disease of the kidneys and the heart. Bright's disease of the slowly progressive hardening type is nearly always accompanied by hard arteries, high blood pressure, and enlargement of the heart and the aorta. Acute Bright's disease also may be accompanied by high blood pressure. Sudden attacks of convulsions in pregnant women (eclampsia), and other kidney diseases of pregnancy, always cause high blood pressure. Focal infection from the teeth and the tonsils may lead to Bright's disease and high blood pressure. (See chapter 76.)

Symptoms: The symptoms of high blood pressure vary greatly. Overweight, a florid complexion, and apparent robust health may be the only outward manifestations of high blood pressure in a man fifty or sixty years of age. In such cases, the blood pressure instrument may reveal a pressure of 180 mm. to over 200 mm., while the individual experiences little or no discomfort of any kind. In these cases, it is probable that the high pressure has preceded the hardening of the arteries and is a direct cause of the hardening.

On the other hand, pallor of the skin, with weakness, often indicates a primary arteriosclerosis. There may be dizziness or headaches accompanying the high pressure. Enlargement of the heart and hardening of the kidney substance almost invariably accompany artery hardening as a part of the same process. Attacks of severe pain about the heart (angina pectoris) are not uncommon in young or middle-aged persons with high blood pressure. Persons with hard arteries sometimes have transient attacks of paralysis or loss of speech lasting a few hours or a day, and these may be repeated at intervals of weeks or months. Such attacks are often falsely called apoplexy.

Hardening of the arteries in the extremities may lead to gangrene of the toes or the feet. However, when due to disease of the arteries, gangrene more frequently results from an inflammation or infection that obliterates the opening of the artery, leaving it a solid cord. The beginning of this disease (endarteritis obliterans), or of the hardening of the arteries of the leg, may produce the symptoms called intermittent claudication (transient lameness). In this case, the individual in walking experiences lameness or a cramping pain in the leg, which is relieved only by stopping to rest, after which he goes on again, only to have the same distress reappear after a few minutes of exercise.

Treatment: The treatment of arteriosclerosis is a failure, as the change in the blood vessels is a permanent one, and cannot be

removed when once acquired. However, there is much that can be done for high blood pressure before hardening of the arteries occurs or before this becomes extreme. The treatment should be carried out along several lines, all of which are very important.

Diet is of first importance, and he who would lengthen his life must draw the reins on his appetite. There must be discarded from the diet all meats, fish, and fowl; all condiments, such as mustard, peppers, chilis, ginger, vinegar, *et cetera*. These are all stimulants and irritants to the nerves and the blood vessels in direct proportion to the amount used. Excessive sweets, with rich pastry and desserts, must be omitted. Stimulating foods and sweets tend to overeating. Tea and coffee are especially injurious in high blood pressure cases. Wines, liquors, and tobacco, while always harmful, are doubly so in hypertension. The liver is the organ that works over and destroys poisons, partially protecting the system for a long time; but after many years of dietetic abuse and overwork, it becomes incapable of fully performing this function, and the patient is left at the mercy of his own bad habits.

The diet should be simple, natural, and non-irritating. Whole grain cereals and breads form the main part of the diet; but with these, green vegetables and fruits should be used freely. Nuts must be taken sparingly if at all; but ripe olives are very wholesome and may be eaten at almost every meal. Salt must be used very moderately, and in some cases, restricted to the amount naturally present in the food. This precaution is necessary where there is much kidney disease, and always where dropsy is present. In the latter case, the Karell diet, consisting solely of about thirty ounces of milk each day, may be beneficial for a short time. Except in dropsy and some other kidney diseases, water and other fluids may be used freely.

Rest, with freedom from mental stress and nerve strain, is imperative in all cases of high blood pressure. The usual business, professional, or social duties and cares must be entirely laid aside. Even the visits of friends and relatives may have to be restricted or prohibited for a time. Very few persons with high blood pressure improve while taking active exercise; and hence physical as well as mental rest must be observed. Complete rest in bed may be absolutely necessary to secure lowering of the blood pressure.

In the use of hydrotherapy, the cases of high pressure must be divided into two classes,—those without definite kidney or arterial change, and the Bright's disease (nephritis) type. In the former, no vigorous or tonic hydrotherapy or even massage

should be used. The neutral or warm bath with complete rest in bed gives the best result in such cases.

In the cases due to kidney disease, sweating treatments three or four times a week are the most effective. They relieve the damaged kidney of part of its work in eliminating poisons. Mild tonic treatments, such as the warm or graduated shower or cold mitten friction, may be used with some of these patients, but are not without danger, and never should be undertaken without the physician's order.

A form of high frequency electricity called auto-condensation is beneficial in cases of high pressure. The results are about the same as with the warm bath. Both treatments may be used daily. There are very few medicines that have any permanent effect. The nitrites are often used on the physician's order; but unless very mild and in small doses, they are best reserved for emergencies and special symptoms, such as angina pectoris, and other forms of blood vessel spasm, as intermittent lameness.

In cases of arteriosclerosis with advanced Bright's disease, forcible lowering of the blood pressure with nitroglycerin is often harmful or dangerous.

ANEURYSM

An aneurysm is an enlargement or bulging of an artery, and is due to weakness of the arterial wall, or to increased blood pressure, or both. It is always a serious condition. It is most common in the aorta in the chest, and next most common in the popliteal artery of the leg behind the knee. It may occur in any artery of the body. A similar condition in a vein is known as a varicose vein, though the two differ much in cause and in results.

Causes: There are various causes for weakening of the arterial wall, such as injury, acute infections, and the poisons of lead, alcohol, and tobacco; but the most frequent cause of arterial degeneration is syphilis. Rarely are signs of this disease absent in a patient with aneurysm, especially of the aorta.

Aneurysm occurs oftenest between the ages of thirty and forty-five, and oftener in men than in women, five to one. It is common in Negroes, and in men who do heavy muscular work, as iron and steel workers, draymen, and stevedores. The principal causes are muscular strain, with high blood pressure in those with weakened or degenerated artery walls.

Symptoms: The symptoms of aneurysm of the aorta in the chest may at first be slight and few, such as shortness of breath or slight pain on exertion. Later there may appear a peculiar, persistent, brassy cough, much pain, shortness of breath, swelling

of one arm, or bulging of the chest wall. In early or doubtful cases, the X ray is the most certain means of diagnosis.

Treatment: There is very little that can be done for aneurysm. The patient must observe physical rest, partial or complete, according to the severity of the disease. If the pain is severe, the physician may order pearls of amyl nitrite or tablets of nitroglycerin. Such accidents as hemorrhage into the chest or the lungs, or even the erosion of the chest wall and skin, with external bleeding, may cause death. Rest, physical and mental, with great restriction of liquids, and free bowel movements, produce as much benefit as anything.

A popliteal aneurysm shows itself by bulging behind the knee, with aching or pain in the same location, and lameness. It is a serious condition, but fortunately may be successfully treated by operation.

Aneurysm of the abdominal aorta is much less common than aneurysm of the thoracic aorta. Many individuals suffering of neurasthenia fear this disease because they feel and may even see a peculiar throbbing in the region of the stomach. This fear is very seldom well founded. The pulsation is only that of a normal abdominal aorta, the sensation being exaggerated by sensitive nerves.

APOPLEXY

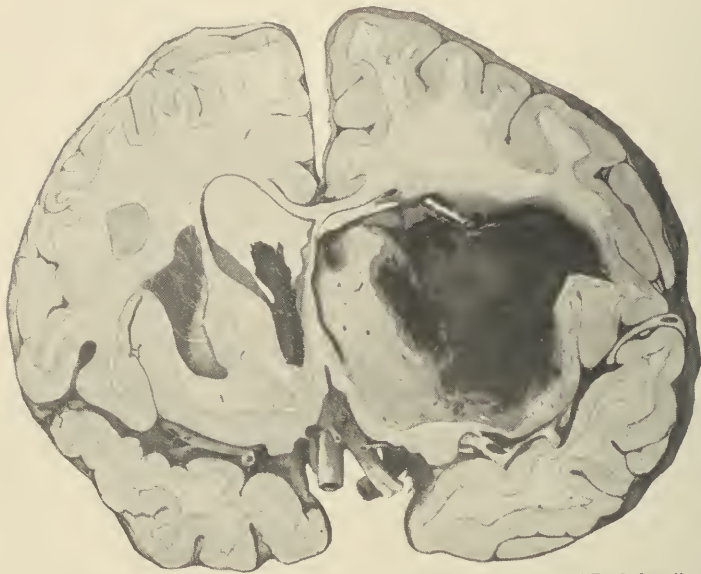
Apoplexy is the rupture of a blood vessel, usually an artery. It is most common in a certain artery of the brain, so situated that the hemorrhage damages the nerve fibers that control the movements of the body, and paralysis of one or more parts results. Apoplexy means, to non-medical persons, the same as "a stroke of paralysis." This is not strictly correct, as paralysis of a part or a full half of the body, coming on suddenly, may be attributable to other accidents in the blood vessels besides rupture and hemorrhage. One of these is the lodgment in an artery of a floating body (embolus), such as a small piece of clot from the heart valves. This accident — embolism — if it occurs in the brain, may result in a sudden paralysis, the same as a hemorrhage (apoplexy). Then again a clot may form in one of the brain arteries, producing the same result, that is, the sudden development of paralysis.

A cerebral apoplexy occurs in those with high blood pressure and hard, brittle arteries. It may be very slight, with recovery in a few weeks; or it may be very severe, producing death in a few hours.

Symptoms: Apoplexy always comes on suddenly. The individual may be stricken when sleeping or eating. There is uncon-

sciousness; and if standing, the person falls. The breathing is heavy, and the cheeks puff out with each breath. The paralyzed side is limp, and often of a dusky color. If the face is involved, the mouth is drawn to the unaffected side, and the paralyzed side of the face is smooth and expressionless. The muscles of speech may be involved along with other muscles, and so the words spoken be very indistinct and unintelligible.

Treatment: Those who witness the stroke should make the person comfortable, elevating the head and shoulders slightly.



From MacCallum's "Pathology"

The dark portion represents a blood clot in the brain, due to apoplexy—rupture of a blood vessel.

In order to limit the hemorrhage as much as possible, the patient should be moved only as much as is necessary to secure his comfort. Cold compresses or an ice bag should be placed on the head. The call of a physician will determine any further attention necessary. Consciousness may be regained after a few hours or days, and gradual recovery take place.

If the hemorrhage is not too extensive, the paralyzed muscles may entirely recover voluntary motion; but usually more or less loss of motion remains permanently. After about four to six weeks, faradic or sinusoidal electricity may be used to stimulate

the nerves and the muscles, and thus aid in their recovery. Massage and tonic hydrotherapy may usually be used after three weeks. An endeavor should be made to keep the blood pressure as low as possible, and the patient must lead a quiet and regular life. Some live very comfortably five or ten years after an apoplexy before another stroke.

VARICOSE VEINS

Varicose veins are very common in the leg below the knee, and appear as large, dilated, and tortuous veins just under the skin. In two thirds of the cases, the condition appears before the age of forty; and in one third, before the age of thirty. Men are affected more frequently than women. In women, pregnancy and pelvic tumors predispose to varicose veins. Probably in many cases there is a weakening of the wall of the vein from chronic inflammation (phlebitis). The wearing of constricting bands about the leg or above the knee is a contributing factor. Occupations that require long hours of standing cause varicose veins in many persons, because of the weight of a long column of blood in a vein the valves of which are broken or defective. Such a varicose vein may appear along the inner front side of the thigh and leg or along the back side of the knee and leg. These veins are placed just under the skin, and so do not have the support of the muscles, as do the deeper veins of the leg.

Varicose veins of the leg may appear after an attack of milk leg (thrombophlebitis). This is an inflammation of the deep vein of the thigh, and is manifest by pain or aching just below the groin, and by tenderness in this region, and usually by a moderate rise in temperature. It tends to complicate confinement, operations, and acute infectious fevers, as typhoid, scarlet fever, or influenza. This disease — phlebitis — should be treated by strict rest in bed, with the leg well wrapped in a heating pack (either moist or dry) and elevated on pillows. (See chapter 10.) In some cases, an ice bag directly over the upper part of the vein is beneficial.

Massage or rubbing is dangerous in acute phlebitis, as a clot may be dislodged and pass to other parts, causing serious damage or death. The patient must remain in bed until the swelling has disappeared. This will return slightly when he gets out of bed, and but little standing and exercise should be allowed while any swelling continues. If the opening in the vein is much narrowed as a result of the phlebitis, and always if it is obliterated, varicose veins will appear on the leg.

Besides the aching in the leg, three very annoying conditions may result from varicose veins. These are swelling (œdema),

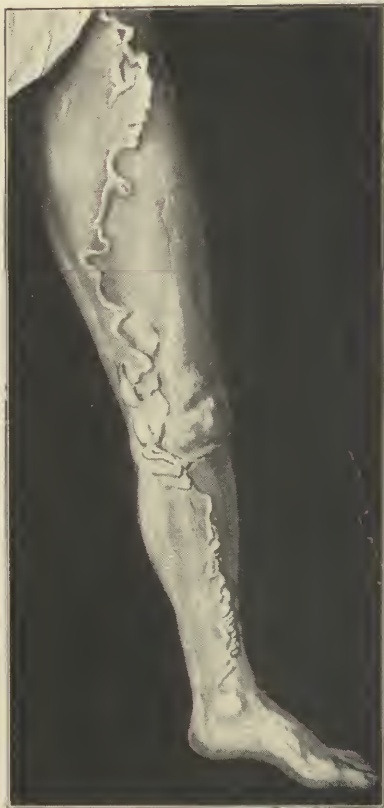
eczema of the skin of the leg, and ulcer. All three exist in the worst cases.

Varicose veins and varicose venules appear elsewhere in the body. Varicose veins of the spermatic cord are called varicocele.

Those at the rectal opening are called piles or hemorrhoids. (See chapter 29.) A somewhat similar condition of the blood vessels, occurring as a congenital growth, may be seen about the scalp, the face, the mouth, the neck, or the arms. These are usually in the form of a small bunch of dilated vessels. Such a tumor is called an angioma or *nævus*. It is very likely to become larger or cause trouble from pressure on other parts, and must be removed by operation or obliterated by injections of boiling water. This, of course, must be done by a physician.

Treatment: There is no treatment of varicose veins of the leg which is entirely satisfactory in all cases. An elastic or nonelastic bandage is most commonly worn by those who have varicose veins of the leg. The bandage affords lateral support to the veins, thus compressing them to a moderate degree, and gives relief from aching. A little time is required to apply it accurately and comfortably, hence many patients prefer to wear an elastic stocking made to measure. This gives great relief in the majority of cases. Where the deep veins are not obstructed, surgical operation may be successful.

On account of the slow return of blood through these dilated veins, the circulation of the leg is retarded, and poor nutrition results, with the formation of ulcers of the skin just above the



Varicose Veins

ankle. These varicose ulcers are very difficult to heal, and may return after healing has occurred. Neither the eczema nor the ulcers are benefited greatly by ointments, lotions, or antiseptics, and these may even do harm. A mildly antiseptic ointment is sufficient for dressing the ulcer. Strong antiseptics should not be used. A very small amount of a zinc oxide ointment may be used with benefit, and should be renewed morning and evening. The following formula may be used:

LASSAR'S PASTE

R

Zinc oxide	2 drams
Boric acid	2 drams
Petrolatum	up to 1 ounce

Directions: Apply on cloth and place over ulcer.

Fortunately, a very beneficial form of treatment of varicose ulcers with eczema and dropsy is a simple one that anybody can use at home. This treatment is the alternate hot and cold leg bath. (See chapter 10.) It is conducted by immersing the legs alternately in the hot and the cold water, one or two minutes in the hot water, and one half to two minutes in the cold water. The duration of the cold should be one half to twice that of the hot, beginning with the former proportion, and after a few days, changing gradually to the latter proportion. This treatment should be applied for twenty to thirty minutes once or twice a day until the ulcers are all thoroughly healed. After healing has occurred, the treatment may be used daily, or two or three times a week, as may appear necessary. The results are marvelous in the eyes of chronic sufferers who have spent months or years to little or no purpose with all sorts of other treatment.

Quite recently it has been learned that some forms of "phototherapy," or treatment with light produced by a special form of electric light applied directly to these ulcers, is remarkably effective in causing them to heal. (See chapter 11.)

Gentle daily massage is also very beneficial in improving the circulation. This the patient may do for himself. It goes without saying that those who are much on their feet must change their occupation to something that requires little or no standing.

Whenever an opportunity affords, the leg should be elevated, to favor the return of the stagnant blood. (Syphilitic ulcers in the same location are common, but a Wassermann blood test will distinguish such.)

Diseases of the Blood

In a strict sense, there are no diseases of the blood. If the blood is abnormal, something has injured it, or there is a disease of the organs of the body that produce the blood. We all know that blood is essential to life, because it carries to the tissues of the body the materials that are absolutely necessary to keep them alive, and carries away from them the poisons that otherwise would destroy them. So a person or an animal always dies if a large part of the blood is lost from the body. The blood is so essential to life, that in the Bible, it is used to represent life. (Leviticus 17:13, 14.)

STRUCTURE AND COMPOSITION

The structure and composition of the blood are very interesting. It is a rather thin, yellow-tinged fluid in which float billions of minute bodies called cells or corpuscles. These cells are of three principal kinds: red cells, white cells, and blood platelets.

The red cells are the most numerous, there being five million in a cubic millimeter of blood. (A cubic millimeter is about one sixty-fifth of an ordinary drop of water.) The red cells contain the red coloring matter, hæmoglobin; and it is this which gives the red color to the blood, and the pink tinge to the healthy skin, and which carries the oxygen from the air in the lungs to all the tissues of the body. If the number of red cells in the blood is greatly lessened, or if the red coloring matter is diminished, the condition is called anæmia. If the quantity of blood in the body is diminished, this also is called anæmia.

Some of the red cells in the blood are constantly dying and being dissolved; but in health, they are just as rapidly replaced by new cells, which are produced by the marrow of the bones, in the tissue that is called red bone marrow. Examination of the blood indicates that each red cell has a life of several months in the blood before it dies and is replaced. Blood cells, of course, can be seen only with a microscope. The red cells are about one three thousandth of an inch in diameter.

The white corpuscles are much less numerous than the red, there being only one to about 600 red cells. The white cells are not all identical in appearance. Several kinds are recognized. They have many different purposes, or functions, including the destruction of injurious material, and helping to repair injury to the tissues. Like the red cells, the majority of the white cells

come from the bone marrow; but some of them come from other tissues, and especially from so-called lymphoid tissues.

In many conditions, the number of white cells in the blood becomes greatly increased. This is called leucocytosis. The most frequent causes of this are the infectious diseases usually associated with fever. Advantage is taken of this fact, in making the diagnosis of many diseases; for instance, appendicitis.

The blood platelets are much smaller than the other cells, and are more numerous than the white cells, but less numerous than the reds. They also come from the red bone marrow. They have a definite part to perform in the process called the "clotting" of the blood. (See color plate, page 20.)

EXAMINATION OF THE BLOOD

Physicians are now able to take a small portion of blood and examine it in many different ways, including microscopical examination of the cells, and chemical and other tests of the blood fluid. The amount of hæmoglobin, or red coloring matter, is tested by comparing the color of the blood with a standard color. Blood for examination can be obtained by pricking the finger or the edge of the lower part of the ear with a sharp-pointed instrument. It is always preferable to take from the ear rather than the finger, because this is much less painful—in fact, almost without pain. For some tests, a little more is needed, and this is taken from a vein in the arm through a hollow needle.

If the amount of blood in the vessels of any part of the body is too great, the condition is called congestion or hyperæmia. If there is too little blood in the vessels of a part, the condition is called local anæmia. One example of this is seen in "fainting," which is simply a temporary loss of consciousness, caused by lack of sufficient blood in the vessels of the brain, from various causes, such as a very hot bath, which permits the blood to accumulate in other parts of the body and deprives the brain of its natural supply. The condition we call pallor or paleness is the effect of a deficient amount of blood in the skin of the face or of other parts of the body. Some people, however, have a natural pallor, due to the character of the skin or of its blood vessels, which prevents the color of the blood from showing through readily.

The amount of blood in the body is about one fourteenth to one nineteenth of the entire body weight. So a person weighing 150 pounds has approximately ten pounds of blood. The sudden loss of three or four pounds of blood by hemorrhage sometimes results in death, but not always. A great deal more than this may be gradually lost during a period of several hours or a day or two, and death not result. When a large quantity of blood

is lost by hemorrhage, the volume of the blood in the vessels is quickly restored by the passage of fluids from the tissues into the blood.

ANÆMIA

Deficiency of blood may be caused in many ways. If we are able to recognize the causes of the condition, it is termed secondary anæmia. There are conditions characterized by anæmia of which the real cause is entirely unknown. These are called primary anæmias. The two chief forms of the latter are pernicious anæmia and greensickness (chlorosis).

Secondary Anæmia. Some of the more important recognized causes of this are sudden hemorrhage of a large amount, or repeated small hemorrhages, such as often occur in bleeding piles, or in abnormal bleeding from the womb, which may be caused by fibroid tumors of the womb. Other causes of secondary anæmia are starvation for any reason, such as inability to swallow food or to digest it properly; various infectious diseases, like typhoid fever or tuberculosis; the presence of intestinal parasites, such as hookworms; extensive malignant tumors, as in cancer of the stomach; and numerous dangerous poisons, as lead, mercury, or arsenic, taken into the body in small amounts. Some of the symptoms of anæmia from any of these causes are loss of strength and weight, pallor, faintness, breathlessness, slight fever, sometimes swelling of the feet. The changes in the blood itself in secondary anæmia can be recognized by examination of the blood.

Treatment: The treatment for anæmia of this kind consists of fresh air, appropriate rest, and an abundant supply of good food. The first essential, as would be taken for granted, is to remove or to prevent the recurrence of the cause. Sometimes this is possible and sometimes it is not possible. The giving of iron as a medicine is usually considered beneficial, but this is open to serious question. Experiments have been conducted recently to determine the usefulness of the salts of iron. In these experiments, dogs were used. On two successive days, the dogs were bled, a large amount of blood being taken. This, to be sure, was done in a painless manner. Their blood was then examined every few days for a considerable period of time. On a diet of mixed foods, the blood would be completely restored in from four to seven weeks. If, in addition to an ordinary mixed diet, cooked meat was given, the restoration of the blood was somewhat more rapid. By careful observation, it was noted that the administration of different sorts of inorganic salts of iron, such as Bland's mass, the form that is generally used as a

medicine for human beings, did not in any degree hasten the recovery of the blood.

Greensickness (*Chlorosis*). This is a peculiar form of anæmia occurring exclusively in young women, beginning usually between the ages of fourteen and seventeen. For some unknown reason, this disease is much less commonly seen in this country in recent years than formerly. The causes are unknown. Probably poor food, overwork, lack of exercise and fresh air, and constipation are contributing factors.

Symptoms: A yellowish green pallor of the skin, with breathlessness, palpitation of the heart, sometimes fainting, unnatural appetite, and swelling of the feet in the more severe cases. There is no appreciable loss of weight or flesh. The changes in the blood are definite, and easily recognized by a physician. They include a great decrease in the amount of coloring matter of the blood, but very little decrease in the number of red cells.

Treatment generally gives relief. It consists largely in rest in bed, and remedies to relieve the constipation (see chapter 29). The administration of iron in proper form and amount by the physician is believed to have a beneficial influence in this disease.

Pernicious Anæmia. This is the commonest and most important of the so-called primary anæmias. It occurs oftener in men than in women. Apparently its frequency is increasing in this country. Its causes are obscure. Possibly auto-intoxication from the intestinal tract is partially responsible. In some cases, intestinal parasites and hemorrhage seem to have had an influence.

Symptoms: Among the prominent symptoms are a waxy appearance and lemon color of the skin without any evident loss of flesh, extreme languor and weakness, breathlessness and palpitation, and characteristic changes in the blood. Nervous symptoms due to destructive changes in the spinal cord and having some resemblance to locomotor ataxia are frequent. In most cases, there is soreness of the mouth and the tongue, with pus formation around the teeth (pyorrhea), and decrease or absence of hydrochloric acid in the stomach fluid. In the later stages, there is usually swelling of the feet. The disease is almost invariably ultimately fatal, sometimes lasting only a few months, and at other times several years. In most cases, there are periods of improvement, when the patient apparently gets well; but the symptoms recur, and the patient finally dies. There have been a few cases reported in which permanent recovery took place.

The treatment should include rest in bed, open air, abundant food, care of the mouth and the teeth (see chapter 27), and the giving of hydrochloric acid, under a physician's direction, for

the digestion. The transfusion of fresh blood from a healthy person gives temporary relief. This often seems advisable in order to prolong for a season the patient's life, but it cannot give ultimate cure. The transfusion must not be attempted by anyone except a physician skilled in the procedure. The selection of the person from whose veins the blood is taken must be made by accurate examination of the blood of the patient as well as of that of the one giving the blood (donor), including a test of the compatibility of the two bloods. The donor should always be tested for syphilis. The fact that a person who may propose to donate his blood belongs to the same family does not necessarily mean that his blood is suitable. If the blood of an unsuitable person is used, death may result. In fact, it has resulted in several such instances.

LEUCOCYTHÆMIA, OR LEUKÆMIA

This is a rather uncommon disease of the blood-forming organs of the body. It is characterized by a great increase in the numbers of leucocytes, or white corpuscles, in the blood, and an overgrowth of those tissues which produce the white blood cells. Two principal types of the disease are recognized by microscopic examination of the white corpuscles in the blood. In one form (lymphoid), there is a great overgrowth of the lymph nodes (lymph glands) throughout the body. In the other form, there is an immense overgrowth of the spleen, which lies in the upper part of the left side of the abdomen, as well as an overgrowth of the bone marrow. This type is called myelogenous leukæmia.



In one form of leukæmia, there is an immense growth of the spleen, which lies in the upper part of the left side of the abdomen.

This disease is thought to be invariably fatal. Seemingly the most effective treatment consists in the administration of the X ray or the radium rays to the spleen or to the enlarged lymph nodes, as the case may be. This treatment has given relief and greatly prolonged life in many cases. In some, there has appar-

ently been a permanent cure. This assuredly must only be undertaken under the direct care of a physician.

PURPURA

This is a condition in which there occur larger or smaller hemorrhages into the skin, resulting in spots of dark reddish discoloration upon the skin, accompanied, ordinarily, by similar hemorrhages in the mucous membranes and other internal surfaces, often with the escape of blood from the mucous membranes, as into the stomach and the bowels, with vomiting or passing of blood. Purpura is not really a disease, but is simply a symptom of some diseased condition. The cases are commonly divided into three classes: first, symptomatic purpura, where the hemorrhages are a symptom of such diseases as cerebrospinal meningitis, typhus fever, malignant endocarditis, septicæmia, and many other diseases; second, purpura associated with inflammations of the joints, which are usually called rheumatism; third, purpura hemorrhagica. This is in most instances a very serious disease, with areas of hemorrhage in the skin and other parts of the body. The areas of hemorrhage are large and numerous. There is vomiting of blood and escape of blood from other mucous surfaces. It may be fatal, or the patient may recover after ten days to two or three months. In some cases, the symptoms may be very severe, and the patient may die within a few hours.

Treatment: The general treatment of this condition consists of rest in bed, plenty of fresh air, and good food (see chapter 22). There are also various things that can be done by the physician, including hypodermic injections of epinephrine, and intramuscular injections of human blood that has been collected by drawing from a vein and kept from clotting in a solution of sodium citrate.

How to Recognize Hemorrhage. In this connection, it is of interest to note some points regarding the appearance of these small or larger spots of hemorrhage, which means the escape of blood from the vessels into the tissue itself. The areas are only slightly raised above the general surface of the skin, and at first are deep red, gradually changing to blue, green, brown, and yellow, as the blood is absorbed and disappears. Such an area can be distinguished from an area of congestion where the increase of blood is in the blood vessels, by the fact that in hemorrhage, pressure upon the spot with the ball of the finger will not cause the red color to disappear, while if the redness is due to congestion, it will disappear and the skin appear momentarily white, and then the blood will rapidly come back into the area.

Hemorrhagic Diseases of the Newborn Child. This is a rather frequent condition, and where it does occur, is often fatal unless relieved by treatment. The causes are not well understood. In some instances, there seems to be an epidemic type of the disease, in which numbers of newborn babies are affected in a hospital or a community. In these cases, the coloring matter of the blood is found in large amounts in the urine. Syphilis in the newborn baby is the cause of some of these hemorrhages. However, the majority of the cases do not belong to either of these classes. In this, there is hemorrhage from the bowels, the stomach, the mouth, or other mucous membrane, or from the navel. The most frequent source of the blood is the bowels (called *melæna neonatorum*). Practically the only satisfactory treatment is the transfusion of fresh blood from a healthy person. This must, of course, be done by the physician. It produces remarkable relief, and often will save the life of the unfortunate infant. Apparently the care exercised in determining the compatibility of the blood used for older persons is not necessary for very young infants. Generally the blood of one of the parents is used.

HÆMOPHILIA

This is a very peculiar but fortunately a rare disease, the sufferers from which are called "bleeders." It is strictly a hereditary disease. The manifestations are seen in childhood, and gradually decrease with advancing age, unless the patient succumbs in the meantime. There is a tendency to bleed for a long period from a trifling injury to the skin or the mucous membrane, as from the extraction of a tooth. Sometimes the attack of bleeding begins without apparent cause. The hereditary transmission of this condition is very interesting. It always occurs in men and boys, never in girls and women. It is never transmitted from father to son, but always through the mother. That is, a man who is a "bleeder" may have sons, but they will not be "bleeders"; he may have daughters, but they will not be "bleeders"; but sons of these daughters will very likely be "bleeders."

Laboratory tests on the blood of "bleeders" show that it is very deficient in power to clot. If a quantity of the blood is removed from a vein and allowed to stand in a vessel or a test tube, it clots much more slowly than the blood of a normal person. There is no curative treatment known, but the attacks of bleeding can be readily stopped by the transfusion of blood from a normal person by a physician who is trained in that procedure.

CHAPTER 36

Diseases of the Lymph Glands

There is in the body a class of organs composed of so-called lymphoid tissue. The structure of this tissue is characterized by cells of small size called lymphoid cells, or lymphocytes. The cells are identical with certain white cells of the blood. (See chapter 35.) The organs containing these peculiar cells are of considerable interest and worthy of our consideration. (See color plate, page 19.)

LYMPH ORGANS

Some of these organs are the *spleen*, a large solid structure in the upper left side of the abdomen; the *thymus gland*, in the chest cavity, just behind the upper part of the breastbone; and the *lymph nodes* (or lymph glands), of which there are five or six hundred scattered in different parts of the body. These latter vary in size, but are all small, mostly not larger than an ordinary white bean. They are situated in three principal groups: first, those in the body wall, including many in the neck region, and a lesser number in the regions of the armpits and in the groins; second, a large group in the chest cavity; and third, large numbers in the abdominal cavity.

There are also numerous patches of this tissue in the digestive canal, especially in the lower part of the small intestine, called Peyer's patches, which are particularly affected in typhoid fever. Another important example of lymphoid tissue is the tonsils, situated on the side walls of the throat, just above the back part of the tongue. The appendix is another organ that contains a large proportion of lymphoid tissue.

The use of these structures is not well understood. Any of them, including the spleen, the thymus, and the tonsils, can be removed without apparently causing any harm or producing any effect upon the condition of the body. However, we know that these organs serve as the point of origin of a large portion of the white cells of the circulating blood. It is also proved that such lymph nodes throughout the body act as obstructions to foreign particles, disease germs, and even chemical poisons, in their passage toward the great blood stream of the body.

All the channels that carry the lymph fluid from various parts of the body toward the large veins in the chest pass through these lymph nodes, which act as sieves to catch up and sift out harmful materials.

ENLARGEMENT OF THE LYMPH GLANDS

Practically all the disease conditions affecting the lymph nodes produce an enlargement or swelling of these structures which can be easily seen and felt if the affected nodes are situated close to the body surface. This oftenest occurs in the nodes in the neck region. These swellings may be painful and tender if they are caused by inflammation or come on rapidly. If the enlargement is slow, the swellings are usually without pain. We sometimes speak of these swollen nodes as "kernels" when they are felt under the skin just below the jaws or about the neck.

Causes: Following is a short list of the more frequent causes of enlargement of the lymph nodes:

1. Acute (sudden or short-lived) inflammation caused by infection in the region drained by the lymph channels that pass through the lymph nodes of the region.

2. Glandular fever, and other acute general infections, as typhoid, smallpox, *et cetera*.

3. Tuberculous infection of nodes.

4. Syphilitic diseases.

5. Hodgkin's disease, leukæmias, pseudo leukæmia, lymphosarcoma.

6. Secondary tumors (cancers).

7. Simple lymphoma.

1. *Swollen Lymph Nodes.* We have all doubtless seen examples of swelling of lymph nodes due to sores or infection in some adjacent part of the body. A sore throat, a sore mouth, a bad cold in the nose, or disease in the ears may be accompanied by swollen and tender glands (kernels) on the side of the neck and underneath the jaws. These swellings subside with the disappearance of the conditions that occasioned them. The disease germs and their poisons that are the cause of the sore throat travel through the lymph channels to the lymph nodes, and there lodge and produce the soreness and swelling of these nodes. An infected hand, or a sore on a hand or an arm, often causes swelling of glands in the armpits (axillæ). Sores on the scalp are often accompanied by swollen glands on the back of the neck. Likewise infection of a foot, and also infections of the external genital organs, frequently cause swelling of glands in the groin.

Especially with some of the venereal diseases affecting the genitals, and swollen glands in the groin, these glands may soften

and break down with pus formation. When suppuration and signs of softening occur in swollen lymph nodes, the physician should treat these by opening with a knife to let the pus escape and hasten healing. Otherwise the only treatment indicated for swollen lymph nodes is the use of hot applications, such as fomentations.

Occasionally a long continued inflammation caused in this way may result in a permanent enlargement of the affected gland.

2. *Acute General Infections.* In various more or less serious acute infectious diseases, including scarlet fever, smallpox, and typhoid fever, many of the lymph nodes throughout the body are swollen and inflamed.

The disease called bubonic plague (see chapter 73), which is ever present in certain countries, especially those of Asia, and which is usually transmitted from diseased animals, such as rats and ground squirrels, often by the bite of fleas, gets its name from the fact that in most cases, the lymph nodes throughout the body are inflamed and suppurate. Such lymph nodes are called buboes.

There is another disease, comparatively unimportant, known as glandular fever, and sometimes seen as an epidemic, in which the lymph nodes, especially in the neck region, are swollen and tender. This disease lasts a few days, and there is some fever.

3. *Tuberculous Infection.* Tuberculosis frequently involves the lymph nodes of the body, most frequently those on the side of the neck. This condition is much oftener seen in children than in older persons, and is sometimes called scrofula. In some instances, these glands break down and suppurate. Operations are not so often performed upon these nowadays as formerly; and in most cases, the patient recovers under treatment suggested in chapter 47. In many of these cases, the bovine or cattle tubercle bacillus is found to be the cause of the disease, the child having doubtless been infected from the milk or milk products from tuberculous cows.

4. *Syphilis* (see chapter 71) always involves the lymph nodes as the disease progresses. Accompanying the primary sore (or chancre), which is usually upon the genitals, there is swelling of the lymph nodes in the groin. Later, in the second stage of the disease, the glands throughout the body become moderately but rather permanently enlarged. The swollen glands in the groin in the early part of the disease may suppurate. In that case, they should be opened by the physician and treated in a surgical way.

5. *Hodgkin's Disease, et cetera.* This is a group of very serious diseases characterized by progressive enlargement of the

various lymph nodes throughout the body, beginning in the axillæ or the groins or the internal groups of glands, but most frequently starting in the neck glands. Each of these diseases is almost invariably finally fatal; but fortunately they are of comparatively rare occurrence. This group of diseases includes Hodgkin's disease, lymphosarcoma, lymphatic leukæmia, myelogenic leukæmia, and possibly some other rare forms. The leukæmias are accompanied by marked changes in the blood of the body, including a tremendous increase in the number of white corpuscles in the circulating blood. (See chapter 35.) Some of the leukæmias have been treated by X ray and especially radium, with remarkably favorable results.

6. *Secondary Tumors.* Another important cause of enlargement of lymph nodes in certain regions is the growth within them of malignant tumors (cancers), which have resulted from the transference of the cancer cells to the gland from the original seat of the cancer. Examples of this occur in the glands of the armpit, cells being carried from cancer of the breast; in the glands under the jaws and on the neck, to which cells are carried from cancer of lips, mouth, and tongue; and similar conditions in other parts of the body.



Hodgkin's Disease

These secondary tumors in the lymph nodes are an indication of the spread of the disease; and after they have appeared, there is much less hope of being able to eradicate the cancer. As long as the cancerous process is confined to the original seat, it can readily be removed by surgical operation; but when it has begun to spread, the limits of this spread cannot be easily determined, and hope for its complete removal is small.

7. *Simple Lymphoma.* There are probably a few cases of enlargement due to simple growth of the lymphoid tissue which cannot be classified in any of the above forms. These cases are unimportant. The name "simple lymphoma" is applied to them.

THE SPLEEN

The spleen is a solid organ located in the abdomen, just underneath the diaphragm, in the left side of the body. Its structure is that of a modified lymphoid tissue, somewhat like the

lymph nodes already mentioned; but it is much greater in size, weighing about one third of a pound. It has a very large blood supply, and is often said to be the graveyard of the red blood cells, where they disintegrate after they have served their purpose and lived out their life span. However, as before stated, the spleen seems not to be indispensable, as it can be removed experimentally in animals without apparently producing any injurious effects upon the animal's health. In disease conditions involving the spleen, it has frequently been removed from human beings without any unfavorable consequences.

There are a number of conditions in which the spleen becomes so enlarged that the physician can easily recognize its large size in examining a patient, and sometimes it becomes so large as to be easily felt by the patient himself.

In typhoid fever, there is a decided enlargement of the organ. In cases of malarial infection which last for a long time with repeated attacks of chills and fever, the spleen usually becomes much enlarged and firm in consistency. This can be felt, and is often called an "ague cake." In many cases of syphilis also, there is enlargement of the spleen.

There are several rather poorly understood conditions in which the spleen is enlarged, including Banti's disease, Gaucher's disease, primary splenic anaemia, *et cetera*. An important but uncommon condition in which there is jaundice and enlargement of the spleen is called hæmatolytic jaundice (involving degeneration of the blood).

In a number of these conditions, it has been found that marked improvement of the bodily conditions can be brought about by surgical removal of the enlarged spleen.

In addition to the foregoing, the group of disease conditions including the various forms of leukaemia, as well as Hodgkin's disease, mentioned earlier in this chapter, are often characterized by great enlargement of the spleen. The most notable example of this is myelogenic leukaemia, in which the spleen reaches an immense size, filling a large part of the abdominal cavity. In none of these latter conditions is surgical removal of the spleen advisable; and in most of the instances in which it has been undertaken, results have been fatal.

THE THYMUS

This organ is a very peculiar one, mostly of lymphoid structure, situated in the upper part of the chest cavity. It has its largest size in childhood, and normally it practically disappears by fifteen years of age. Experiments upon animals seem to indi-

cate that this organ is not essential to life. In fact, its removal is followed by no change that can be determined.

About the only important condition in which this organ is involved is that known as lymphatic constitution or status lymphaticus. This is a form of natural bodily deficiency that is very common. About ten per cent of people are said to be so affected. The notable characteristics of the condition are the following: an unnatural large size of all the lymphoid structures of the body, including the presence of a large thymus, which persists and is present after the age when it should disappear. The large blood vessels of the body are abnormally small in size, with other deficiencies of the internal organs. In males, the skin texture, absence of abundant hair upon the skin, and general bodily contour approach the female type. In this connection, it is worthy of note that the condition is six times as frequent in men as in women.

A notable feature is the frequency of the occurrence of sudden death in these people. Death may occur while taking ether or other anæsthetic, or from some slight accident, or from other inadequate or unrecognized cause. The explanations given are that the death is due to unusual susceptibility to certain poisons, or to the rupture of small blood vessels in the brain, vessels that are unnaturally weak, with thin walls.

Another fact of great interest in this connection has been observed: A large proportion of criminals, people who commit suicide, and others who show gross moral deficiency, have the bodily peculiarities of status lymphaticus. This presents to one's mind the question as to how far acts of crime and delinquencies in conduct, which we call sin, can be laid upon such bodily deficiencies for which the individual is not responsible; and, on the other hand, how far individual will and choice can be held responsible. A careful consideration of the problem must lead to the conclusion that while such constitutional defects may be powerful factors in determining our personality and character, we cannot escape the fact that moral stimuli arising from environment and association, and above all, the influence of the religion of Jesus Christ, are also determining factors. Otherwise why do not all of us who may belong to the ten per cent showing the physical stigmata of status lymphaticus and related conditions succumb to the great spiritual tragedies?

Disorders of the Ductless Glands

Among the many marvels of the human body, most wonderful of all are the glands of internal secretion. These small organs, unknown and unappreciated until comparatively recently, are really the executive department of the body, and serve as regulators of the chemistry of the body, or the metabolism, as it is usually termed.

These glands of internal secretion are so called because, unlike other glands, which secrete their products and discharge them through ducts, they have no visible outlet, and their products are carried away by the blood, which circulates through them.

The substances manufactured by these glands bring about remarkable changes in the body, and are technically known as hormones—from the Greek word meaning “I arouse,” or “I set in motion.” The function of these chemical messengers is to initiate certain physiological activities in various parts of the body. For instance, they are concerned in the intricacies of growth and development, and the numerous functions of the body which are carried on automatically day in and day out, without thought or desire on our part. The circulation of the blood is largely regulated by these hormones. The subtle changes in the cells as a result of which food is absorbed and the wastes are prepared for elimination, are controlled chiefly by hormone action. The indefinable elements that differentiate the genius from the idiot, the temperamental from the phlegmatic, the child or adult who “catches everything” from the one who is never sick, all are results of the influence of these ductless glands of internal secretion. Even the fundamental racial characteristics are thought to be traceable to this origin.

Hormone production, or the function of internal secretion, is not limited to the ductless glands. Other organs evidently exert a dual function; in addition to their obvious or external glandular secretory action, they also possess the faculty of secreting into the blood chemical principles that are active in parts remote from the organ of origin. Among these are the liver, the pancreas, and the mammary glands.

BEST KNOWN DUCTLESS GLANDS

The best known ductless glands are the thyroid, the thymus, and the pituitary gland, the spleen, the adrenals, and the sex glands.

The thyroid is a small flattened body lying upon the windpipe (trachea) in the front of the neck. When enlarged, it is commonly known as goiter.

The thymus is chiefly active during prenatal life and early childhood, and is believed to atrophy or disappear before puberty. It lies beneath the upper part of the breastbone, or sternum.

The pituitary gland, lying in the *sella turcica*, a bony cup in the skull at the base of the brain, was at one time regarded as the source of pituita, or the mucus that accumulates in the upper part of the throat. Hence its name. We now know that the pituitary gland has two dissimilar parts, producing several internal secretions, which regulate the development and function of the sex glands, the growth of bone, and the breaking up of sugars. This remarkable little gland also encourages the other ductless glands in various ways.

The spleen is a comparatively large organ that lies in the upper left part of the abdomen, and is one of the mysterious organs of the body. It is concerned in the production as well as the destruction of the blood cells. It is supposed also to "fix" iron and various other mineral substances taken into the body, and to change them in such a way that they may be retained for useful service in the organism, instead of being eliminated. The spleen evidently is one of the defensive organs of the body, and is especially concerned in diseases like malaria and typhoid fever.

The adrenal glands, as their name implies, are added to the renal glands, one lying like a cap upon each of the kidneys. Their internal secretion is a definite chemical substance, isolable in crystalline form. It controls the heart and the vessels so that the pulse rate and the blood pressure are maintained by the continued production of this chemical messenger, which has been called adrenin. The adrenal glands also have much to do with the maintenance of muscular tone, especially of the involuntary muscles (those over which the will has no direct control), and, as we shall see later, are easily exhausted, with a resulting symptom complex that is as distressing as it is frequent.

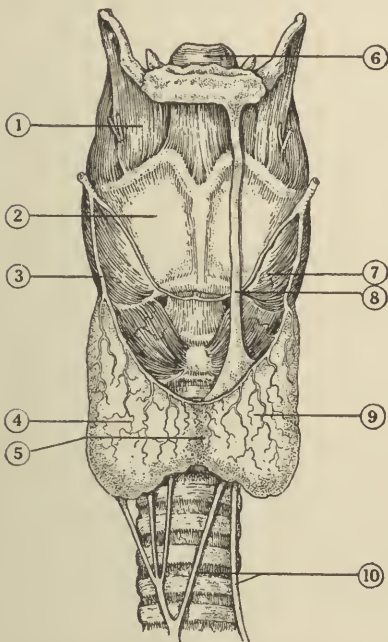
The sex glands are important as organs both of reproduction and of internal secretion. Their function is initiated at puberty, and their hormones are responsible for those essential changes of feature, form, and function characteristic of the sexes.

There are other internal secretory organs that we will barely mention. Their function is not well known, and they are merely noted here for the sake of completeness. These are the *parathyroid glands*, four small organs that lie very close to the thyroid gland, on the front of the trachea; the *pineal gland*, a small pro-

jection from the brain, between the two hemispheres, that may have some influence upon our mental development; and certain cells in the upper part of the small intestines, that have the faculty of producing a hormone named secretin, the function of which is to stimulate the production of pancreatic juice and other of the digestive enzymes.

DISORDERS OF THE THYROID

Most important of all the glands of internal secretion is the thyroid, which lies in the front of the neck. Its size is no indication of its influence and importance to the body, for it weighs less than an ounce, and ordinarily is not seen, unless enlarged, as in goiter.



Front view of the larynx, the upper part of the trachea, showing the thyroid gland in position

1. Muscles of the larynx
2. Thyroid cartilage
3. Superior thyroid
4. Right lobe of the thyroid gland
5. Isthmus of the thyroid
6. Epiglottis
7. Muscles of the larynx
8. Small muscle attached to the thyroid gland
9. Left lobe of the thyroid gland
10. Inferior thyroid veins

Goiter. The most common thyroid disturbance undoubtedly is goiter, a condition of glandular enlargement which sometimes assumes very great proportions. There are several varieties of goiter which need not be enumerated here. It may be well to mention the two chief classes,—the one in which the gland is so inherently lazy or tired, or the demands upon it are so much greater than its normal secretory power, that it enlarges itself in an effort to meet the needs of the body; and the one in which the thyroid reacts to certain poisons, particularly those produced in foci of bacterial infection, and as a result of this irritation, the gland enlarges. The symptoms as well as the treatment of these forms of goiter are quite different; for in the first class, the effort should be to supplement the deficient thyroid, while in the other, the hidden source of irritation should be sought and controlled.

These two extremes of thyroid activity are called, respectively, hypothyroidism, or insufficient thyroid activity, and hyperthyroidism, or thyroid excess. Either of these may or may not be accompanied by goiter, but invariably they cause changes in the functions directly controlled by the thyroid hormone.

Hypothyroidism. The consequence of hypothyroidism is that heat production is lessened and all the chemical activities of the body are slower. The temperature is subnormal, one of the commonest symptoms being chilliness, and an increasing desire for more clothing, and especially bed clothing. Cell oxidization and elimination are reduced; and as a result of this, a condition of cellular infiltration follows, which is no other than the retention, on the part of the cells, of their own wastes, until they become swollen with effete matter—bodily clinkers. No organs are exempt from this insidious infiltration. It invariably changes the skin, causing it to become puffy, rough, thickened, and puttylike; the hair becomes dry and falls out easily; and the nails are cracked and brittle. The body as a whole is fat and soggy. If this infiltration occurs in the vocal mechanism, the quality of the voice is changed; if in the ear, hearing becomes less acute; if in the brain cells, memory and perception are impaired, and the sufferer becomes sluggish and perhaps depressed. If the liver is affected, biliousness and even gallstones may follow; and if the alimentary walls are influenced, constipation and stasis result. Any or all of these conditions may be present, as there is no limit to the extent of this baneful influence. Severe cases of hypothyroidism are clinically known as myxœdema, which may be present in varying degrees of severity.

Further, this very condition of deficient oxidization and waste accumulation serves to overburden the eliminative organs, including the thyroid itself, and forms a vicious circle continually making bad worse. The patient is heavy and inactive, the circulation is deficient, nutrition is poor, and anæmia is the rule. Rheumatic conditions are common. Cracking in the joints is also a symptom often noticed. (See under "Cretinism," chapter 40.)

Hyperthyroidism. The opposite extreme of thyroid activity is hyperthyroidism, which is quite another matter. Here there is too much activity, the sympathetic nervous system is continually on edge, the temperature may be increased, the body chemistry is overstimulated, and as a result, there is rapid loss in weight. Then, too, the heart and the circulation are greatly burdened, the pulse rate is markedly increased, and the extra work very rapidly wears out the heart. Since the nervous system is continually irritated by an increase in the stimuli that nor-

mally keep it in proper tone, the patient suffers seriously from slight stimuli, such as a noise, bad news, or any of the ordinary external impressions that make no change in a normal person. These patients also sometimes acquire a peculiar staring appearance, due to an increase in the tension of the eye muscles, or to congestion behind the eye. This is sometimes called exophthalmos; and since the thyroid often enlarges, the disease is commonly known as exophthalmic goiter. The treatment of exophthalmic goiter ordinarily has been the surgical removal of a portion of the overproducing gland. Every effort should be made to remove the causes of the glandular irritation before any surgery is attempted.

Causes: There are three principal causes of this condition. Chief among these are foci of infection in tonsils, teeth, sinuses, appendix, gall bladder, colon, or pelvis—indeed, any place where bacterial invasion may cause the accumulation of poisons, which, absorbed into the blood, irritate the thyroid gland. The next most common source of thyroid irritation is the production in the body, especially in the alimentary canal, of protein putrefactive products (see chapter 25), which act as irritants—"auto-intoxication" is the usual name. As a matter of fact, chronic colitis is a very common cause of thyroid irritability, just as are the unfortunate tendencies to eat meat, which is easily putrefiable, and to drink coffee, with its toxic caffeine, which acts upon the thyroid exactly as do any other poisons.

Emotional stress is a very frequent cause of thyroid stimulation. The emotions, if allowed to run riot, always exert an influence upon this gland, and the French have even called it *la glande de l'emotion*. While those who do not have enough thyroid activity are apathetic and disinterested, those whose thyroid glands are unusually irritable are themselves temperamentally plus, and lean toward sympathetic irritation.

Finally, another cause of hyperthyroidism is excessive activity on the part of other glands of internal secretion. An abnormal supply of the normal products, which play upon the thyroid by the very degree of their concentration, serves to irritate the thyroid and thereby keep it working overtime, and through it, practically all of the rest of the body.

Treatment: The most satisfactory treatment for hyperthyroidism is the removal of all of these forms of toxæmia. Rest is of paramount importance, not merely to spare the heart, but to reduce the production, in the body, of its regular wastes, all of which are doubly irritating to the thyroid because of its unusual sensitiveness. The diet should be very carefully regulated, in order that as few as possible of the purinelike bodies

referred to in chapter 25, may be ingested. Any disturbance in the other glands of internal secretion absolutely must be controlled simultaneously with efforts to modify the thyroid activity itself, which is done sometimes by electricity, or by the use of ice bags and other local measures to reduce the circulation and thus prevent the carrying away of the excess of hormones from the thyroid.

Thyroid disturbances may indeed cause marked changes in the nutrition of the body, and unfortunately a tendency has developed to use thyroid treatment in obesity. This should never be done save under the care of a physician, because there are various forms of obesity, and the improper administration of thyroid extract may cause a functional overstimulation of the gland, with a result that is worse than the original condition for which it may be given. On the other hand, many persons who are very thin and badly nourished have a latent thyroid trouble that is at the bottom of their difficulty, and which, if overlooked, will never be modified by diet and ordinary treatment that neglects this fundamental cause. Thyroid troubles are very common, and deserve the most careful study of physicians.

Goiter Districts. It is a well recognized fact that certain geographical areas are goiter districts. In these districts, many people are afflicted with enlarged thyroids. There are such localities in Switzerland and other parts of Europe. The central portion of the United States, particularly around the Great Lakes, is an area of this kind. Physicians have discovered that the tendency in young people and children in these districts to develop goiter can be largely controlled by the administration of iodine compounds in small amounts over short periods several times a year. This discovery is proving of great benefit. Physicians will prescribe and give directions for such administration of iodine.

THE ADRENAL GLANDS

These two little organs, no bigger than good-sized strawberries, are located above the kidneys. They are essential to life, and upon their incessant activity depend those functions which have been called autonomic or sympathetic. The adrenal principle is said to regulate the tonicity of the heart muscle and the small muscles of the blood vessels, and thus keep the pressure of the circulating blood sufficient for all purposes. In fact, it maintains the tone of all the muscles of the body, and particularly the unstriped muscle, which is not controlled by the will. It is also the mainspring of the intricate mechanism whereby the body reacts to poisons. If a person takes poison, the first evidence is an increased pulse and heart action, which is the result of

the stimulation of the adrenals and the consequent release of a quantity of its hormone, adrenin. This quickens those activities responsible for the oxidization of the poisons and the hurrying of the blood flow to bring them to convenient exits through liver, lungs, and skin.

Emotional influences affect the adrenals exactly as do poisons; and—as already mentioned in regard to the thyroid gland—fear, rage, and pain stimulate adrenin production. This would seem to be a protective reaction, as we shall shortly see. Professor W. B. Cannon, of Harvard University, has demonstrated that the usual reactions due to these emotions are largely, if not wholly, the result of adrenal stimulation. He determined this experimentally in two ways. The amount of adrenin in the blood was estimated in a number of cats before and immediately after a severe fright. Almost invariably the production of this substance was increased by the emotional stimulation, while thereafter it fell sharply—the adrenals were overstimulated and consequently depleted.

Again it has been discovered that the adrenal glands are responsible for the liberation, from muscular tissue, of the sugar that these cells are capable of storing up for emergencies. The mechanism for the release of emergency sugar is brought into play in the manifestations which follow fright. The combination of emotions developed in “the fright, fight, and flight complex” involves the adrenal glands. An excess of adrenin in the blood is believed to be responsible for the marked circulatory changes experienced during fear—the cold, clammy skin, or the hot, flushed skin, the raised hair, and the other automatic responses to such emotions. At the same time, this muscle sugar, or glycogen, is released in large quantities, to meet the necessities of the occasion; that is, if the muscular system must be exerted unduly, there may be ready in the circulation an excess of the necessary food to maintain this activity.

Professor Cannon’s most interesting series of experiments was with the students in Harvard University who were playing football. He found, for instance, that the emotional strain of a football match with the Yale team liberated much additional adrenin, which in turn freed such an excess of sugar, that it was not all burned up as the result of the unusual activity, and glycosuria, or sugar in the urine, was present in a large percentage of these students. In other words, unusual adrenal activity causes such a change in the chemistry of the body, that sugar is released for service, and sometimes in such a degree that the unsuspecting kidneys have to intervene and remove it

from the circulation, because one of the functions of the kidneys is the removal of an excess of sugar in solution in the blood.

All of this is extremely significant when applied in the study of sympathetic nervous diseases, inasmuch as through it is discovered a basis for the emotional cause of disease. Emotional stress causes definite changes in the nutrition as well as in the nervous system; and those persons whose temperament is of such a character that slight emotional changes are important and prominent, are subject to disturbances which really are due to overactivity of the adrenal glands.

The importance of the reaction of the adrenal glands to poison has been merely suggested here. Of course, these poisons may come from acute infectious diseases or infections; and since these are so common, one would naturally expect that there would be an adrenal aspect to a large number of conditions. This is indeed the case, although only within recent years has the medical profession begun to appreciate the adrenal side of the acute infections. A good deal of interest along these lines has resulted from the extraordinary frequency of severe asthenia, or fatigue, following influenza. It has been conclusively proved, both by clinical experience, and by actual study of the adrenal glands, as well as of other organs, of individuals who have died of influenza, that the severe poisoning so thoroughly changes the adrenal glands, that there ensues the condition which has been called hypoadrenia, somewhat similar in character to the hypothyroidism previously mentioned.

Hypoadrenia is a very common condition. The principal symptom is marked weakness—the muscles do not have their normal stimuli from the adrenals, and therefore they are relaxed or atonic. As a result of this, the heart does not work as thoroughly as it should, the muscles in the blood vessels are relaxed, and there is a low blood pressure, and progressively poor circulation, with cold hands and feet. The chemistry of the body is very materially slowed, and the degree can be determined by measuring the various urinary solids in the twenty-four-hour specimen. In addition to this, the temperature usually is subnormal. The pressure at which the chemistry of the body is maintained, like the blood pressure, is lessened, and there ensues a serious condition of poisoning akin to that which we find in hypothyroidism. Quite the most important of all the symptoms is the fatigue syndrome, which is nothing but chronic tiredness. Really, the ordinary fatigue that we are accustomed to note at the close of our day's work is an accumulation of poisons due to the working of the cells of the body, and the stimulation, by these poisons, of the adrenal glands, causing a slight depletion.

This depletion is permitted to disappear during the processes of rest, when the cell activities are slowed automatically and there is time for the body to eliminate the day's accumulation of waste. Persons who do not give themselves proper rest and who are careless of their sleep find that they are acquiring a chronic fatigue and lack of "pep" which is nothing but adrenal depletion.

Treatment: Hypoadrenia, or adrenal insufficiency, then, is a very common symptom. The treatment consists in removing the cause, which may be ill advised habits or the poison due to infections. Restore the adrenal glands by rest, and remove, as far as possible, all other forms of toxæmia. This includes the cleansing of the alimentary tract, the regulation of the diet, and the removal from it of easily putrefiable foods, such as meats—especially canned meats—and also coffee, tea, and condiments.

It is also possible to apply the principles of organotherapy in these cases, thereby supporting the adrenal glands and increasing the oxidation; and often this is the only recourse in the treatment of the serious conditions of a run-down nature which follow acute and chronic infectious diseases.

Hyperadrenia. Adrenal overstimulation, or hyperadrenia, is not so common as hyperthyroidism, chiefly because the adrenal glands are not so "tough" as the thyroid, and their product, adrenin, is oxidized very rapidly. Yet there must be such a condition as hyperadrenia; and sympathetic irritability, nervous tension, and certain circulatory disorders, it has been determined, are the result of excessive adrenal action. Hyperthyroidism practically always involves the adrenals, first overstimulating them, and later wearing them out.

Addison's Disease. There is an important and interesting disease associated with tuberculosis of the adrenal gland, called Addison's disease. This is fortunately a very rare condition, but is practically always fatal. Some of the prominent symptoms are extreme loss of strength, and an unnatural change in color to brown, yellow, or black, in portions of the skin, especially the exposed portions. This disease apparently is never cured, but can often be helped by the administration of thyroid substances combined with extract of the adrenal (epinephrine).

THE PITUITARY GLAND

Perhaps the most mysterious of all the glands of internal secretion is the hypophysis or pituitary gland, which, as we have seen, seems to be a projection of the brain tissue, the size of a hazelnut, lying carefully protected in a bony cup, the *sella turcica*, at the base of the brain. If a finger is pointed backward

at the center of the forehead and another finger is pointed side-wise over the temple, the place where these two lines meet is approximately the position of this gland.

While the pituitary gland seems to be a part of the brain, its microscopical structure shows that it is made up of three parts, each quite different in appearance from the others, and evidently having a different function. The anterior lobe is the largest part, and looks like gland tissue; the posterior lobe seems to be a nervous structure; while between the two is a "stalk" by which the gland is attached to the brain.

This organ was discovered many hundreds of years ago. Some thought that it might properly be called "the seat of the soul," while others, notably Galen, thought that it was responsible for the production of pituit, or mucus. Its real value was not appreciated until 1895, when Sir Edward Schafer, of Edinburgh, found that it was an internal secretory organ.

The pituitary gland is incessantly producing hormones, which influence practically all parts of the body. At least four or five of these chemical messengers, it is believed, are produced in the different portions of this gland. These have much to do with the stimulation of growth, including that of the sex glands, and are particularly concerned in the development of the bones. It seems that growth and development are regulated chiefly by the anterior lobe, and a chemical substance called thyroxine has been isolated from this gland. This is thought to be the "growth-stimulating hormone." The posterior lobe is intimately connected with the regulation of the chemistry of the carbohydrates; and by long and tedious experimentation, many interesting facts have been developed which now give us definite information in regard to many conditions of disturbed chemistry which we can connect with this mysterious little organ.

Two developmental disturbances, one of which is known as acromegaly, and the other as gigantism, are related to excessive activity of the pituitary. Acromegaly involves a marked enlargement of the bones of the face and especially the extremities; and usually in these cases, there is a pituitary tumor. When the pituitary gland, in early life, is either overstimulated or larger than normal, this overgrowth of the bones causes gigantism; and many of the giants exhibited in circuses are cases of chronic hyperpituitarism. When the pituitary gland is overstimulated after maturity, the bones become heavy and thickened, but not particularly longer.

In the opposite condition, that of the diminutive but well formed individual, it is believed that the principal deficiency is that of the hormones from the anterior lobe of the pituitary.

It has been shown, by various workers, that the influence of the pituitary gland upon the sex glands is very intimate and important, and really starts at the age of puberty. If the pituitary gland functions insufficiently — hypopituitarism — there ensues an atrophy of the sex glands and a functional inactivity which causes asexualism and sterility. Amenorrhea, or absence of the menses, often is the result of pituitary insufficiency.

The influence of the pituitary gland upon the sex glands and especially upon the ovaries continues throughout active sex life. The pituitary gland evidently has some routine function of assisting the ovaries to perform their usual monthly service to the body. Occasionally the ovaries are not as active as they should be, with varying degrees of amenorrhea; and in many of these instances, there is a peculiar headache of the pressure type — that is to say, it seems as though something in the skull were trying to spread out. This is now attributed to temporary enlargement of the pituitary gland, due to its efforts to assist the ovaries by working a little harder and producing more of its hormones. Under such circumstances, the gland becomes engorged and slightly enlarged, and the increased pressure — because the gland is limited in its little bony cup with the brain above it — causes a severe pressure headache. This seems to be proved by the fact that when the ovarian function has materialized, the headache stops; or if the pituitary gland is supported by means of organotherapy, the headache is promptly relieved.

Unusual fatness, especially when accompanied by a lack of sex development or activity, is usually a manifestation known as the “adiposo-genital dystrophy of Fröhlich.” This is probably due entirely to pituitary insufficiency, and sometimes has been remarkably modified by feeding of the gland.

OVARIAN DISORDERS

As has been already intimated, the sex glands are also important glands of internal secretion, and their hormones have much to do with the development of feature, form, and function that distinguishes the sexes. As with the other glands of internal secretion, the sex glands, or, as they are technically known, the gonads, are a part of the ductless gland chain, and are related intimately to all the others. They exert a very definite influence upon the other glands, and, in turn, are influenced by them. For this reason, our added knowledge of the relations of these glands has given us a means of controlling disturbances in their function, particularly that of the ovaries.

The internal secretory function of the ovaries controls menstruation, the procreative functions in general, and many

sympathetic nervous manifestations that are connected with puberty, menstruation, and the change of life. Consequently the study of the ovaries as internal secretory organs assumes a very great importance.

The hormone function of the ovaries begins at puberty and is responsible for the deep-seated changes of this epoch, including menstruation; hence the numerous disturbances of menstruation necessarily must be connected with the production of this internal secretion. Among these may be included various degrees of what is known as amenorrhea, or absence of the menses, which ranges from long-standing absence of the flow, through irregular menstruation, to a somewhat delayed or scanty menstruation. Frigidity, sexual apathy, and sterility are also based upon the same fundamental causes. Pelvic congestion, dysmenorrhea, or painful menstruation, in its varying manifestations, and occasionally menorrhagia, or flooding, usually depend almost entirely upon abnormal functioning of the ovaries and related glands.

It is easy to see that many functional nervous conditions may be the result of disturbed ovarian function; and many cases of neurasthenia and associated mental and physical ills may be connected in some way with the menstrual ovarian function.

A Typical Case. Here is a more or less typical case of ovarian insufficiency: The patient complains of uncomfortable sensations, such as pelvic heaviness, vague nervous manifestations, and a feeling of general *malaise*, or illness, for a long or shorter time prior to each expected menstruation. Delay is the rule. Irregularity of onset and a scant flow are customary. During the period of delay, the patient may, and, indeed, often does, suffer of severe colds; old tonsillitis lights up; headaches of quite decided severity are common; and in fact, the patient is so tired and below par at that time, that any latent condition may become aggravated because of the temporarily lowered resistance. This is especially true of those who are tuberculous, and it may be said with emphasis that the regulation of disturbed ovarian function should be a routine measure in all women with tuberculosis. When the menses do begin, and are properly started, these troubles disappear until the next premenstrual delay. Frequently this element of delay itself favors a condition of neurasthenia and worry, which only adds to the trouble.

Physiologists have shown, and clinical experience likewise proves, that the ovaries are connected with the other glands of internal secretion. Undoubtedly the thyroid controls ovarian function. We have seen that the child with thyroid insufficiency does not develop sexually. The thyroid hormone encourages menstruation; and conditions of hypothyroidism, such as have

been already mentioned, very commonly determine a lack of sexual development, and amenorrhea. It may be interesting to recall that frequently there is a sympathetic enlargement of the thyroid gland during pregnancy, when, as will be remembered, the ovarian function virtually rests and menstruation stops.

The pituitary gland also is functionally related to the ovaries. A remarkable syndrome, described by Fröhlich, due to pituitary insufficiency, always causes ovarian insufficiency, so much so that there is not merely a functional inactivity with amenorrhea, but there may be a distinct atrophy, not only of the ovaries themselves, but of the uterus and the external genitalia.

At the menopause, or change of life, ovarian hormone production ceases, slowly or suddenly; and the delicate hormonie mechanisms of the body are sometimes sadly disturbed. All the glands of internal secretion being in intimate dependence upon one another, the removal of a factor to which the body has been accustomed for, say, thirty years, usually causes trouble. The extent of this depends upon several factors: (1) the previous hormone capacity of the ovaries; (2) the suddenness with which the menses cease (a sudden menopause, like a "surgical menopause" resulting from removal of the ovaries, generally being more severe than when the transition is more gradual); and (3) the sensitiveness and balance of the associated glands, especially the adrenal glands, which, as we know, are particularly influenced by toxæmia and emotional factors. The circulatory unbalance and the nervous changes that accompany the menopause undoubtedly are attributable to the derangement of the relations of these glands by the removal of the ovarian element; and to mitigate the severity of the removal of the ovarian factor by ovarian extract is a very satisfactory method in the control of the serious sympathetic nervous difficulties of "the change."

Another and less frequent form of ovarian functional disturbance is known as hyperovarism; and with it there are evidences of ovarian irritability, such as pain and congestion in the pelvis, protracted and heavy menstrual flow, or menorrhagia, and a general condition of sympathetic irritability and excitement which sometimes amounts to "a real disease."

It has been determined, by experimental work and by clinical experience, that at least in some of the disease conditions dependent upon disorders of the ductless glands, including the ovaries, much can be accomplished in their relief by the administration of glandular substances or of materials extracted from them. The caution should be emphasized, however, that attempt at treatment of this kind should be undertaken only under the direction of a well informed physician.

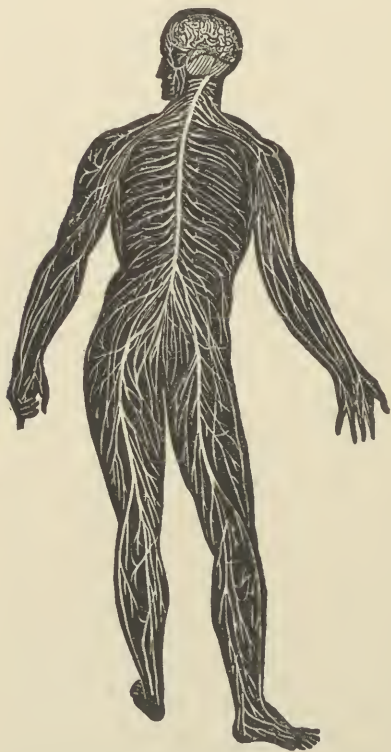
Section IX—The Nervous System

CHAPTER 38

Physiology of the Nervous System

The highest expression of infinite wisdom and power to be found in all the handiwork of God upon earth, is seen in the marvelous design, arrangement, and operation of the organs of the human body. The body temple is composed of vast numbers

of different kinds of living cells. Groups of similar cells are joined together to form structural elements called tissues, such as bone tissue, muscle tissue, and gland tissue. Dissimilar tissues are compactly bound together, or "organized," to form special structures called organs, such as the heart and the liver. Various organs are also associated into systems for the performance of some higher function. For example, the digestive system, for the work of digestion, comprises mouth, stomach, pancreas, intestines, *et cetera*.



The Master System of the Body—Brain,
Spinal Cord, and Nerves

THE MASTER SYSTEM

When we reflect that it is through the instrumentality of the nervous system that all the other organs and systems of the body are regulated and controlled, so that they perform their work in perfect harmony, we can understand why this tissue has been called the "master tissue." When we

further consider that it is through the nervous system that we reason, speak, act, love, enjoy sensations and emotions, make choices, and develop character, this portion of the human habitation assumes a commanding interest and importance.

Nerve tissue is composed of three structural elements,—nerve cells, nerve fibers, and a delicate supporting tissue that binds together the cells and the fibers.

Nerve cells vary greatly in size and in shape. Each cell contains a little mass of denser material, the nucleus, which presides over its nutrition, growth, and other activities.

Within the cell body may be seen many small, dark, energy granules, called Nissl's bodies, of which we shall speak later. Projecting from the body of the nerve cell may be seen two, three, or many little arms or threadlike processes. These little feelers are of two kinds: many which are very short and branch freely, called dendrites; and one long process called the axon, which may attain a length of several feet, and extend from its cell body within the brain down the spinal cord, or from the spinal cord out to a muscle in the hand or the foot.

The axon gives off but few branches except near its termination. Here it ends in a brush-like tuft of branches known as telodendria. The telodendria make touch contact with the dendrites or with the cell bodies of other nerve cells.

These nerve processes—the dendrites and the axons—are the telegraphic wires over which messages travel to and from the brain. The dendrites always carry nerve impulses toward their cell body, and the axon away from the cell body. The axons of many nerve cells are bound together to form nerve trunks, or nerves. They also compose the white matter of the brain and the spinal cord. Each axon is surrounded by a delicate fatty sheath, which gives it protection and acts as an insulator, so that an impulse cannot pass from one axon to another and thus cause confusion.

THE BRAIN

The brain is the largest organ in the body, except the liver. It weighs between forty and fifty ounces. It occupies all the



A Nerve Cell

space within the cranium, or skull, above a line projected backward from the eyebrows through the canal of the ear. It is swung within a hammock of three inclosing membranes, and further cushioned by a jacket of fluid between the membranes.

The brain is a multiple organ, and includes the cerebrum, or forebrain; the mid-brain; and the pons Varolii, the cerebellum, and the medulla oblongata, which together form the hind-brain.

The brain substance consists of gray and white matter permeated by a delicate supporting tissue. The gray matter is made up chiefly of nerve cells and but few nerve fibers. The white matter consists of nerve fibers, and is devoid of nerve cells. The greater part of the gray matter of the cerebrum and the cerebellum lies upon the surface, forming what is known as the cortex. However, a portion of the gray matter, of both the cerebrum and the cerebellum, lies buried within the white matter.

In the mid-brain, the medulla, and the pons Varolii, the gray matter is embedded within the white matter. Here it is broken up into little groups of nerve cells called nuclei. The axons (long processes) of the cells in these little groups unite to form the twelve cranial nerves. Within these important collections of nerve cells are also located the "vital centers," which control the heart's action, the circulation, the respiration, *et cetera*.

The major part of the white matter of the cerebrum and the cerebellum is inclosed within the gray matter; but that of the mid-brain, the medulla, and the pons is disposed mainly upon the surface of these organs.

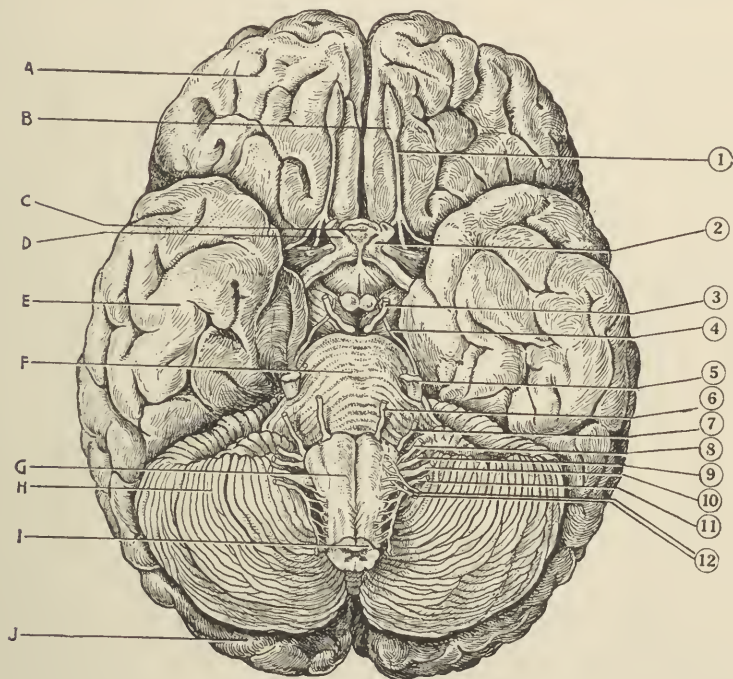
The Cerebrum. This forms the greater portion of the brain, and consists of two halves, or hemispheres. Viewed from above, the cerebral hemispheres form an ovoid mass, which is narrower in front. Their outer surfaces are rounded or convex. Their inner surfaces, which lie together, are flat. These surfaces are separated by a deep vertical cleft, called the great longitudinal fissure. At the bottom of this cleft, the hemispheres are united along their middle third only, by a bridge of nerve fibers (the corpus callosum), which forms a highway for nerve impulses passing between the hemispheres.

The surface, or cortex, of the brain, which, it will be recalled, consists chiefly of nerve cells, is folded upon itself, presenting numerous elevations called convolutions, which are separated by narrow furrows or fissures.

This arrangement greatly increases the surface area (about four square feet) of the gray matter, which, thus compactly folded, can be contained within the small cranial cavity.

With the progress of brain development, the fissures deepen, the gray matter thickens, and the convolutions become more prominent.

The Lobes. Some of the more prominent furrows, or fissures, are used to map out the surface of a hemisphere into regions to which the term "lobes" has been applied. In this brain map, the



THE BRAIN

A. Frontal lobe of cerebrum
B. Olfactory bulb
C. Pituitary body
D. Optic nerve
E. Temporal lobe of cerebrum
F. Pons Varolii

G. Medulla oblongata
H. Cerebellum
I. Beginning of spinal cord
J. Occipital lobe of cerebrum
Numbers 1-12 indicate, in order, the roots of the twelve cranial nerves.

"lobes" might be compared to states, and the convolutions to counties. This division makes it possible to refer to definite regions of the brain.

Extending downward and slightly forward across the side of the brain (cerebral hemisphere), near its center, as seen from the side, is the long "central fissure," which separates the two largest brain lobes, the frontal and the parietal, the frontal lobe

lying in front of the fissure. These two lobes, the frontal and the parietal, are separated from the temporal lobe lying below, by a long, deep furrow, the lateral (side) fissure.

The posterior, or hindermost region of the hemisphere forms the occipital lobe. Two small projections of brain substance, the olfactory lobes, lie one on either side just beneath the frontal lobes.

Functions of the Cerebrum. The "nine thousand million" cells of the brain (cerebrum) all have a definite work to perform. These cells are arranged in layers in the cortex. Different layers in the same region probably perform different functions. The brain is not like the liver, with all its parts doing the same kind of work. It is rather a multiple organ, in which various regions form special "centers," which preside over very different functions of the body. However, we should bear in mind that all the brain cells, regions, and special centers are most intimately associated and connected by a network of interlacing nerve fibers, the complexity and richness of which cannot be described. Not only are all parts of the brain thus connected by these "association fibers," but, by means of the sensory and motor nerves, which enter or leave the brain, and through the sympathetic nervous system, every part of the body is intimately connected with the brain and under its supervision.

"From the time of Galen in the second century of the Christian era, the cerebrum has been recognized as the organ of intelligence and conscious sensation."—*Howell*.

All modern investigation and study has proved further that the seat of consciousness and intelligence resides in the gray matter of the cerebral cortex. The dawn of mentality in the young infant, and its mental growth, depend upon the normal development of its cortical gray matter. In advanced age, the "senile" deterioration of the mental faculties is associated with wasting and degenerative changes of the cells within the cortex. Disease changes and abnormalities in these cells are accepted as the physical basis of the perversions of reasoning and conduct exhibited by the insane and the degenerate.

In general, it may be stated that the higher mental faculties of perception, thinking, reasoning, and judgment reside in the frontal lobes. The chief brain areas for storing up the memories of sensations and perceptions are in the parietal and occipital lobes. The great motor region for the control of the muscles is that portion of the frontal lobe which lies just in front of the central fissure. In this field of motor control, the leg muscles are represented in the highest portion, then following in order, downward, those of body, arm, neck, face, and speech.

The great sensory field for the reception and interpretation of general sensations of touch, pressure, temperature, and pain, is located in the parietal lobe, just behind and parallel to the motor area, and perhaps overlapping it.

The nerve centers for the storage of memories of the movements necessary for speech and writing are, in right-handed persons, located in front of the motor region, within the frontal lobe, on the left side of the brain.

In reality, we taste and smell and hear and see with the brain. Each of the special senses is represented by a nerve center in the brain which receives, interprets, and stores up the memories of objects seen, of sounds heard, *et cetera*.

The centers for vision are located within the occipital lobes. The image of an object seen is focused upon the retinas of the two eyes, and the impulse thus produced is carried over the two optic nerves, most of the fibers of which cross to opposite sides and reach certain relay centers. From these relay centers, new fibers carry them to the special centers, one in each occipital lobe. Injury or destruction of any portion of this entire system will interfere with the sight.

The center for hearing is located in the upper and outer portion of the temporal lobe. The center for either ear is in the opposite side of the brain. The auditory path crosses the visual path near the center of the base of the brain.

The special brain centers that serve the functions of taste and smell are located upon the inner side of the temporal lobe.

The great motor highway of the brain, for transmitting nerve impulses to the muscles, consists of nerve fibers that take origin from the cells in the "motor area" of the cortex. As these fibers pass downward, they converge until they occupy but a small space, and pass through a narrow region — the "internal capsule." Emerging, they descend through the mid-brain, through the pons, and into the medulla. There the greater number cross to the opposite side, and entering the spinal cord, descend to various levels, where they terminate by connecting with the cells of the spinal nerves. It will be seen that the muscles of one side of the body are governed by nerve cells in the opposite side of the brain. This explains why a stroke of apoplexy (hemorrhage or blood clot in the brain) causes paralysis upon the opposite side of the body. If the hemorrhage is within or near the internal capsule, where the motor fibers occupy so little space, a small clot may paralyze the entire half of the body.

The Electric Dynamo. The brain is the electric dynamo of the body. Within it, nerve energy is generated, which circulates over the nerve paths throughout the body and energizes and

vitalizes every organ and structure. The nerve cells are the source of this electrical energy. Within the dendrites and the cell bodies are seen large numbers of dark granules (Nissl's bodies), which are subject to profound changes. During rest and sleep, the nerve cells enlarge, and these energy granules increase in size and number. With prolonged mental or physical strain, the energy granules diminish in size and number. Some authors claim also that there is retraction of the dendrites, so that nerve contacts are more or less interrupted. The brain tissue becomes acid in nature from the accumulation of fatigue products, and one feels weary and exhausted. In this state, it is difficult to concentrate the mind and fix the attention, and memory is less dependable.

Frequent repetition of stimulation, of thought or action, produces well beaten psychic paths; and habits, good or bad, are the result. It is easier to form good habits than to break bad ones. The older one grows, the more difficult becomes the change of any habit.

An infant a few hours old has a brain, but no intellect; it has gray matter, but no intelligence; it has eyes, but to it objects mean nothing; it has ears, but all sounds are alike without significance; it has no memories, for it has had no impressions or communications. It stares vacantly into space, reaches for the moon, and tries to eat its fist.

The brain of the newborn may be compared to delicate impressionable wax, or to a sensitive photographic plate not yet exposed. The completed picture, beautiful or deformed, will depend upon its environment, its education, and its training.

Brain Development. The faculties of the mind are developed by use only. Nature withdraws her gifts from him who fails to improve them. Strong reasoning powers, a good memory, balanced judgment, and a forceful will are not accidental accomplishments. They are the results of mental training. More than any other mental faculty, the will has to do with the formation of character. We may not be able always to control our feelings or emotions, but we can control the will. With it rests the power of decision, the power to choose.

"Keep thy heart with all diligence [or, "above all keeping"]; for out of it are the issues of life." Proverbs 4:23. Without doubt, this Scriptural injunction refers primarily to the mental heart, which is the battle ground of character.

Rightly directed, the will becomes a potent factor in resisting disease. Many patients are professional invalids because they have not decided not to be. Often the will becomes a slave to fear, and the patient is tormented with all sorts of phobias.

Nervous Disorders and Diseases

NEURALGIA

Neuralgia is a painful affection of a sensory nerve, usually due to malnutrition, or to the effect of toxic agents upon the nervous system.

It occurs most commonly in women of nervous temperament in middle or advanced life.

Causes: People living in cold, damp climates are oftenest affected, and the attacks are frequently seen during the winter months, and often bear a definite relation to climatic changes. Exposure to cold, dampness, or a draft of air is the commonest cause of an attack.

Acute infectious diseases, notably typhoid and malaria, chronic affections, such as diabetes, anæmia, syphilis of the nervous system, and arthritis, predispose to neuralgic attacks.

Symptoms: The leading symptom is pain, which comes on suddenly in attacks or paroxysms, followed by intervals of relief. The pains are severe, of shooting character, and dart along the course of the affected nerves. The nerve trunks become sensitive, and tender to pressure, which may provoke a paroxysm of pain. In severe cases, there is twitching of the muscles of the affected part, with burning and tingling sensations in the skin, which may also be the seat of an eruption. The neuralgic attacks are rarely on both sides at the same time, and usually continue but a few days, but may persist for many months. The treatment will be considered with each form of the affection.

FACIAL NEURALGIA (TIC DOULOUREUX)

This is the most common form of neuralgia. The greater number of cases occur in women from twenty-five to fifty years of age.

Causes: The affection is often hereditary. Most of the attacks occur in winter and are excited by exposure to cold. Severe eyestrain, infection of the sinuses of the face, catarrh of the nose and throat, decay of the teeth, chronic constipation, anæmia, diabetes, influenza, and joint disease are prone to bring on attacks of trifacial neuralgia. Age is an important factor, the disease being confined largely to the later years of life.

Symptoms: The overshadowing symptom is agonizing pain along the course of one or more of the three divisions of the sensory nerve of the face. The pain may therefore be located

in the eyeball and over the forehead; in the side of the face, the cheek bone, and the upper teeth; or within the mouth and the lower teeth. The paroxysms of darting pains make the patient eringe, and are accompanied by spasm of the muscles of the face, also tingling and burning of the skin. There is slight redness and swelling of the affected side, and an increased flow of saliva and tears. There may be a skin eruption. The affected nerves and skin become very tender, and movements of the face as in speaking or chewing may bring on violent pain.

Nutrition fails, there is a loss of weight, sleep is disturbed, and the patient becomes mentally depressed.

Treatment: If possible, determine the cause and remove it. The underlying anæmia, diabetes, malaria, *et cetera*, must receive appropriate treatment. Attention should be given also to any existing eyestrain, sinus infection, decayed teeth, root abscesses, or other contributing cause. Protect the part from cold by a covering of flannel or cotton. Prolonged applications of heat, preferably by means of the fomentation, are usually beneficial.

In a large number of cases of true tic douloureux, recovery does not take place except after very radical treatments applied directly to the affected nerve or to the Gasserian ganglion or its roots. This ganglion lies at the base of the brain, in connection with the nerve as it leaves the brain. Injections of alcohol or other destructive material into the nerve itself will usually give relief for a limited time, weeks or months; but final relief will only be secured by destroying the connection of the sensory portion of the nerve at the point where it is attached to the brain. This delicate operation can only be performed, of course, by surgeons especially skilled in such procedures. In many cases where the disease is so distressing as to interfere with all useful work and apparently make death welcome, this operation will transform the patient's life into one of comfort and activity.

INTERCOSTAL NEURALGIA

This is a frequent form of neuralgia which affects the intercostal nerves that extend forward around the chest between the ribs. The pain is sharp and shooting, and follows the course of one or more intercostal nerves. Often there are tender spots upon the skin where the nerve branches come to the surface; that is, near the breastbone in front, at the side of the chest, and near the spinal column.

The pains come in gusts or paroxysms separated by intervals of relief. They are made worse by body movements, such as coughing and sneezing. Not infrequently an eruption of tiny blisters occurs upon the skin in the painful area.

Treatment: In severe cases, the patient should be put to rest in bed and have a liberal dose of Epsom salts. Prolonged local applications of heat help in relieving the pain. Chloroform liniment may be applied hot twice daily. If a skin eruption develops, liberal applications of zinc oxide ointment should be made. The parts should be well protected from exposure to cold.

SCIATICA

This is a neuralgia affecting the sciatic nerve. In a majority of the cases, the irritation of the nerve is prolonged, and a true neuritis develops. It is a common affection, and occurs most frequently in men after thirty-five years of age.

Causes: In addition to the general causes of neuralgia already given, alcohol, direct injury, disease of the spine or of the thigh and pelvic bones, fibroid tumors of the uterus, and pregnancy are common causes.

Symptoms: Sciatica is often of gradual onset; attacks of sharp, tearing, shooting pains occur, which dart down the back of the thigh and knee, affecting also the outer side of the leg, and may extend into the foot. These agonizing paroxysms of pain are aggravated by movement, such as walking or climbing stairs, which places the nerve on a stretch. The painful attacks are worse at night, and increase in frequency until, after a week, the pain is almost constant. The patient refers the pain to the deeper structures—that is, the bones and the muscles. There is burning, tingling, and later numbness of the skin. In severe cases, cramps appear in the muscles, with weakness and some wasting of the limb.

The attack usually lasts three or four weeks, but may persist for many months. Relapses are the rule, but both limbs are rarely affected at the same time.

Treatment: Absolute rest in bed is necessary until the pain subsides. A brisk saline purge, two tablespoonfuls of Epsom salts in water, should be given at the onset, and the bowels kept free.

Every effort should be made to remove the cause and build up the general health. A long, well padded splint may be applied, with the knee slightly bent. Otherwise the limb should be supported by pillows in the most comfortable position, and movement avoided.

Prolonged hot applications to the limb twice daily are useful, to be followed by chloroform liniment; and the limb should then be well covered with cotton wool and bandaged to maintain warmth.

In long-standing cases, gentle massage, stretching the nerve by bending the thigh over the abdomen, and active exercise, may aid recovery.

OVARIAN NEURALGIA

This form of neuralgia is characterized by severe attacks of pain in the ovaries, a result of congestion from some organic disease or displacement of these organs. The attacks are often associated with the monthly periods. Rest in bed, hot douches for twenty minutes in the recumbent posture, local applications of heat to the abdomen, and hot sitz baths are the best methods of treatment. Surgery may be required.

NEURALGIC PAIN IN LOWER SPINE (COCCYODYNIA)

True neuralgia of the sacral nerves is rare. Pain at the tip of the spine is common, being caused by injury of the coccyx at childbirth, or a fall, or disease of the lower vertebræ. It is a common complaint in hysteria, neurasthenia, and traumatic neuroses. Surgery is rarely indicated.

NEURITIS

Neuritis is an inflammation of the motor and sensory nerves. When only one nerve is affected, the ailment is called local neuritis. When many nerves are involved, it is called general or multiple neuritis.

Causes: Local neuritis is due to direct injury to a nerve, as by a blow, a dislocation, or prolonged pressure, or from exposure to cold.

One form of pressure neuritis has been called "Saturday night paralysis." A man "who has dined too well" goes to sleep with his head pillowed upon his arm, which is supported upon the back of a chair. Upon awaking, he finds that his arm has been paralyzed from prolonged pressure upon the nerves. Fortunately such cases usually recover.

Multiple neuritis arises from a great variety of causes, but is essentially toxic in origin. Alcohol is responsible for more than sixty-five per cent of the cases.

The toxins of microorganisms, as those of diphtheria, tuberculosis, syphilis, influenza, smallpox, typhoid, acute rheumatic, and scarlet fevers, come second in importance. Metallic poisoning occurring in those who work in lead, arsenic, mercury, phosphorus, and in the aniline compounds, is a rarer exciting cause. Multiple neuritis may complicate any chronic debilitating disease, such as diabetes, cancer, and anæmia. Tea and coffee must be listed among the exciting causes.

Symptoms: The leading symptom of local neuritis is constant pain, of a burning, boring character, along the course of the

nerve. The nerve trunk becomes tender, the skin sensitive, reddened, and glossy.

The symptoms of multiple neuritis are tingling numbness, pain, and weakness, affecting chiefly the lower extremities. The pains are severe, constant, and of a burning character. The nerve trunks become tender to pressure and may enlarge. The skin is reddened, glossy, and œdematous. The muscles become soft, flabby, and in some cases, show decided wasting. The limbs are weak, and paralysis may ensue. If the power of locomotion is retained, the patient develops a characteristic "steppage" gait. Because of weakness, there is foot-drop, and the knee is lifted too high, in order that the dangling foot may clear the floor. The pains, the numbness, and the weakness may appear in the arms and the hands too. Especially is this true in lead neuritis, which causes also a characteristic wrist-drop.

An encouraging feature of this painful and otherwise discouraging malady is that with proper treatment, complete recovery may be expected in time, which may vary from a few months to a year.

The first requisite is to ascertain and remove the cause. All alcoholic stimulants must be interdicted. In the multiple form, rest in bed is essential. Hot applications for twenty minutes two or three times a day will best relieve the pain, after which the painful parts should be painted with a solution of menthol and oil of wintergreen, and then covered with cotton batting, held in place by a roller bandage. For the local applications, the following prescription has proved helpful:

R

Menthol	4 drams
Oil of peppermint	2 drams
Oil of wintergreen	2 drams
Alcohol	4 drams

Narcotic drugs should be avoided. The continuous warm bath at ninety-seven degrees is useful when the parts are very tender and the disease involves all the extremities. Vigorous massage and passive movements are of value after the painful stage has been passed.

The bowels must be kept free, and the diet should be simple and nontoxic, such as fruit, whole cereals, milk, and fresh vegetables.

Early galvanic electricity from the positive pole may assist in allaying the pain, and later the interrupted current will help to stimulate the flaccid muscles.

SHINGLES (HERPES ZOSTER)

Shingles is a painful acute or chronic affection of the sensory nerves, due to inflammation of the nerve cells in the spinal cord or the brain, from which the nerves take origin. The cause is usually a specific infection of these nerve cells, and this may come from diseased tonsils, abscessed teeth, infected cavities (sinuses) of the bones of the face, *et cetera*. It may accompany tuberculosis or other disease of the bones of the spine, or complicate any acute infectious disease, such as pneumonia, cerebrospinal meningitis, and malaria.

Symptoms: The chief symptoms are neuralgic pains, and a skin eruption in the painful area.

A common location is the side of the chest, following the course of one or more intercostal nerves. After a few days of general depression and exhaustion, slight fever, and gastrointestinal upset, the patient is seized with pains in the side, which are at first mild and of a burning character, but soon become distressingly severe. After three or four days, a red skin rash appears over a narrow zone extending about halfway around the chest. This is soon followed by an eruption of little water blisters, which later become filled with a bloody or purulent fluid.

When one of the cranial upper or lower spinal nerves is affected, the pains and the eruption appear upon the face, one of the arms, or one of the lower limbs. In acute, light cases, recovery may be expected in about ten days; but severe cases may extend over a period of months or years.

Treatment: Rest and quiet in bed are the first requisites. Foci of infection, as diseased teeth and tonsils, must be removed. If the cause is syphilis, tuberculosis, diabetes, or malaria, it should have appropriate treatment by a physician. A mustard plaster over the spine, mild fomentations to the painful zone twice daily, and the local application of zinc oxide ointment or stearate of zinc powder, will be found useful in allaying the pain. The diet should be simple and nutritious, and may consist of milk, eggs, cereals, and fruit.

Free elimination by the skin and the bowels is indicated.

NERVOUS PROSTRATION OR EXHAUSTION
(NEURASTHENIA)

Neurasthenia is a chronic functional disorder of the nervous system, characterized by irritable weakness and nervous exhaustion. It develops commonly in individuals who have inherited an oversensitive, highly nervous temperament, with but little nerve capital or reserve of nerve energy.

Causes: The exciting cause is excessive nerve strain. This is for many supplied in the intense pressure incident to the daily struggle for existence. To this is often added the burden of worry, and a further tax is imposed by the use of various nerve goads or stimulants. The long hours indoors in poorly ventilated offices, intense mental application unrelieved by sufficient physical exercise, the keen competition in social and business life, and the excitement incident to modern city life, all contribute to this state of irritable weakness of the nervous system. In some cases, an acute illness, sexual excess, the use of tobacco or other drug habit, or an injury, has been the determining factor.

Symptoms: Neurasthenia presents a wide variation in its symptoms. The most common is easy fatigue, a feeling of great weariness after slight exertion, or incapacity to perform usual mental and physical labor. There is lack of ability to concentrate, mental depression, morbid fears and anxiety. Neurasthenics complain of impaired memory, and express fear of impending insanity. There is a feeling of fullness, of pressure, or of pain, in the head. There are also pains in the neck, between the shoulders, or in the back and the limbs, with tender spots along the spine. Dizziness, ringing in the ears, and attacks of palpitation and distress about the heart are common symptoms. The patient complains of cold feet, cold, clammy hands, and hot flushes about the head. The appetite is capricious, digestion is disturbed, and constipation is the rule. There may be pronounced physical weakness, with loss of weight. Sleeplessness is a troublesome symptom.

Treatment: The treatment of the neurasthenic requires tactful consideration, a sympathetic interest, unlimited patience, and proper facilities. The milder cases may be treated at home, but the sanitarium *régime* is ideally suited to the care of this ailment. The neurasthenic must be repeatedly assured that his disease is not organic, that it is not incurable, and that with a proper mental attitude upon his part, and with his active coöperation, complete restoration to health may be confidently expected. This may require six months or a year.

Since nerve exhaustion from overstrain is the chief cause, rest is the keynote to proper treatment. In severe cases, with loss of weight, rest in bed for a few weeks and a milk diet are to be advised. In milder cases, the patients should do less work and take added rest. They should avoid all excitement, and discard all stimulants,—alcohol, tobacco, tea, coffee, and patent medicines. A camping trip in the mountains or at the seaside may aid recovery. Drugs are of no value. Hydrotherapy is

of great service, especially when given at a sanitarium where it can be scientifically graduated to meet individual needs. A shower bath or a cold sponge in the morning, followed by vigorous rubbing, is a good tonic. Mild fomentations to the spine, or a neutral bath at 96-98°, with a cold compress to the head, in the evening, is a good sedative and will encourage sleep.

PSYCHASTHENIA

Psychasthenia is a chronic non-dementing disease of the mind characterized by an endless variety of phobias, or fears, and morbid obsessions, which torment and incapacitate the sufferer. It is on the border line between neurasthenia and insanity. Although it may be complicated by neurasthenia, it differs from it in that psychasthenia is inherited, while neurasthenia is acquired. It also lacks the irritable weakness and tendency to fatigue of neurasthenia. It differs from insanity in that the patient is keenly conscious of his mental defects, and admits the unreasonableness of his morbid fears and obsessions.

Causes: The exciting cause is frequently some kind of shock, as an injury or an accident. The use of alcohol, sexual excesses, an exhausting illness, or an acute infectious fever, may be the starting point of an attack.

Symptoms: The chief symptom is some well defined fear which is so fixed in the mental make-up that it has become an obsession. It may be fear of being in a crowd, fear of being alone, fear of a closed room, fear of moving vehicles, fear of contamination by filth or germs. An individual may spend most of his time washing his hands or his clothes. Another may get up a dozen times at night to make sure that the gas is turned off or that the doors are locked.

The condition is accompanied by general nervousness, worry, and insomnia. The person becomes introspective, depressed, and incapacitated for performing his regular duties.

If treatment is begun early, recovery may take place in one or two years; but some cases are incurable.

Treatment: Treatment of psychasthenia in the patient's home is not satisfactory. He should have the advantage of a well equipped sanitarium, where he can receive tonic hydrotherapy, massage, and graduated physical exercise, also proper mental encouragement and training.

ST. VITUS'S DANCE (CHOREA)

Chorea is an acute infectious disease, chiefly affecting children. It is most common from five to fifteen years of age, and is most likely to occur in excitable, high-strung, nervous children, specially in young girls who are given to overstudy at school.

The cause is the same microörganism that produces tonsillitis, acute rheumatic fever, and disease of the heart in children.

Symptoms: For a week preceding the attack, the child is irritable, restless, and fidgety, sleep is disturbed, and there may be night terrors. The disease is recognized by the involuntary, irregular, jerky movements that begin in one hand and arm and may soon spread to the other hand and arm, the face, and the lower limbs.

The jerky movements are constant during the waking hours, and are increased by excitement or embarrassment, but cease during sleep. The child shrugs his shoulders, makes faces, and may not be able to feed himself. In severe cases, there is fever, speech is disturbed, jerky, or impossible, and there is difficulty in walking.

Acute disease of the heart is usually present, and one or more joints may become inflamed. An average attack lasts from six to eight weeks. Recovery is the rule in children, but the disease is very likely to recur.

Treatment: The primary indication is rest for both mind and body. The child must be taken from school, and should be put to bed in a well ventilated room, and should remain there for a few days in mild cases, and for several weeks in more severe attacks. This enforced rest and quiet will lessen the severity of the jerky movements, and will reduce the danger of serious heart complications. Other children should be excluded from the sick room.

Where the period of rest in bed must be prolonged, daily gentle massage and passive movements of the limbs will prevent muscle weakness and wasting. A daily warm bath at 96-98° for one hour is a good sedative. A neutral bath in the evening for twenty minutes, with a cold compress to the head, will induce sleep. If the pulse is very rapid, an ice bag may be placed over the heart for twenty minutes every three hours.

One cannot too strongly emphasize the necessity of having a careful examination made by a physician, to determine the presence of any foci of infection, such as diseased tonsils, adenoids, abscessed teeth, also any reflex irritation, as from eye-strain, intestinal worms, and adherent prepuce.

The diet should be simple and nutritious. If there is fever, milk and fruit juices are the best. The bowels may be kept free by taking a three-grain cascara tablet at night.

DIZZINESS (VERTIGO)

Vertigo is a symptom which may be present in many conditions of disease. Its most common association is with disorders

of the stomach and the liver. This so-called toxic form also occurs in Bright's disease of the kidneys.

Vertigo is a common manifestation of hardening of the arteries with high blood pressure. It also occurs in valvular disease of the heart and in tumors of the brain, and often precedes a fit of epilepsy.

Faulty vision from a lack of proper balance of the eye muscles may cause "ocular" vertigo. Aural vertigo is a rare form due to disease of the internal ear.

In all these forms, the dizziness comes on in attacks. During these attacks, the patient should lie down. If the condition is not relieved by rest, a laxative, and a simple diet, a physician should be consulted.

EPILEPSY

Epilepsy, or "falling sickness," is a malady characterized by convulsive fits of unknown origin. The usual view is that the convulsion is but a nerve storm, or an explosion of pent-up nerve energy.

Epileptic fits begin in early life, rarely after the age of twenty years. Fits beginning after forty are more likely caused by brain tumor, brain syphilis, or hardening of the cerebral blood vessels.

Heredity is believed to play an important rôle as a cause. A parent may be epileptic or an alcoholic, or members of the family may exhibit hysteria, St. Vitus's dance, migraine, or feeble-mindedness. Alcohol, auto-intoxication, head injuries, eyestrain, intestinal parasites, adenoids, *et cetera*, in an individual of faulty nervous organization, may bring on the attacks.

Symptoms: The convulsion is a most distressing thing to see. It comes on suddenly, often without warning. The person shrieks or cries out, stiffens, and falls or is thrown violently to the ground, often sustaining injury in the fall. There is complete loss of consciousness, and the individual cannot be aroused by any kind of stimulation. After this stage of stiffness, which lasts about a minute, there is violent agitation and convulsive jerking of arms, legs, trunk, eyes, and face. There is horrible grimacing, and grinding of the jaws, which may injure the tongue and the cheeks, and the saliva is churned out of the mouth in a bloody foam.

Respiration is interfered with, and the face becomes dark and livid. The bladder is involuntarily emptied, and sometimes also the bowel. After three or four minutes of this ghastly picture, relaxation occurs, the jerky movements cease, breathing becomes heavy and noisy, and the sufferer remains in a state of quiet unconsciousness from a few minutes to one hour.

After an epileptic fit, the person has no knowledge of what has occurred. He is in a dazed condition for many hours, and may not know what he is doing. Individuals in this condition have sometimes wandered from home and become lost. They are irritable, "cranky," and may perform criminal acts.

This description applies to the major seizures, or *grand mal* attacks. *Petit mal* is the name given to partial or abortive attacks. These minor fits may precede *grand mal* attacks for several years, or may accompany them. In these, there is momentary loss of consciousness. The person may suddenly cease talking, drop an object from the hand, or stop playing an instrument, and stare vacantly into space. After a few seconds, the broken contact is again made, and he goes on as if nothing had happened.

It may be well, by way of contrast, to observe that in major hysteria, the hysterical convulsion comes on more gradually, often preceded by an emotional storm of bad temper, crying, or laughing. The person falls carefully, always without injury, the tongue is not bitten, the urine is not voided, consciousness is partly retained, and return to normal is more sudden.

Treatment: During an attack, the patient should be protected from injury, the clothing loosened, and a piece of wood or cork placed between the teeth to prevent laceration of the tongue.

Only a small proportion of epileptics fully recover. Careful search should be made for the exciting cause of the attacks. Alcoholic beverages should not be allowed.

The diet is of great importance. These sufferers are almost without exception gormandizers. Meat, tea and coffee, and rich pastries and desserts should not be permitted. Salt in the diet should be reduced to a minimum. Meals should be taken at regular intervals, should be small in quantity, and should consist mainly of fruit, entire cereals, zwieback, milk, and vegetables. Eggs, legumes, nuts, and cheese should be taken sparingly.

The bowels must be kept free by diet, simple laxatives, or enemas as required.

All sources of reflex irritation, such as eyestrain, nasal polypi, enlarged tonsils and adenoids, adherent prepuce, and intestinal worms, must be removed.

Keep the skin active by frequent warm baths. The patient should lead a quiet out-of-door life with plenty of physical exercise. Bromide of soda or potash should be taken only upon the advice of a physician. These drugs stupefy the nervous system, may cause a skin rash, and often upset digestion.

HYSTERIA

"Hysteria is a state in which ideas control the body and produce morbid changes in its functions."—*Moebries*.

Causes: The chief causes are an inherited instability of the nervous system, combined with bad training in early life. This mental anomaly is oftenest seen in girls and young women of neurotic temperament, who have been educated by over-sympathetic relatives and friends to expect the speedy gratification of every whim and fancy.

Bad hygiene, cramming at school, overdeveloping a sensitive mind in a delicate body, are predisposing factors. The Latin races are most affected. The condition commonly develops between the ages of twelve and twenty years.

Extreme physical prostration, serious illness, mental shock (as grief, business reversal, or love affairs), injury, and menstrual disorders, are the usual exciting causes.

Symptoms: There is no other human affliction that presents so varied, so numerous, and so complicated manifestations. "Hysteria," says Coleridge, "may be fitly called mimosa, from its counterfeiting so many diseases,—even death."

The symptoms may best be understood by considering separately those of the hysterical convulsion and those which remain more or less permanent.

Preceding the convulsion, the individual becomes irritable, restless, introspective, discontented, and manifests an abnormal desire for sympathy. Frequently there is an emotional storm of laughing or weeping, and the patient may then sink into a semiconscious condition, with rigidity of the body, and eyes closed, refusing to talk, and manifesting but few jerky movements of the limbs and the trunk.

In severe cases, there is a pronounced epileptoid convulsion, immediately preceded by a sensation of suffocation or choking, as if a foreign body were in the throat; a severe pain in the head, the pelvis, or the abdomen, or an attack of dizziness and ringing in the ears. Following this "aura," the individual falls gently, selecting some convenient place, and avoiding injury to her person. At first, there is stiffness of body and limbs. The head is drawn backward. There may be grinding of the teeth and congestion of the face. After a brief interval, irregular, disordered, but more or less volitional movements of head, limbs, and trunk occur, care being taken not to suffer injury. These movements may become grotesque and clownish, and the patient may assume various dramatic attitudes, expressive of appeal, defense, scorn, fear, ecstacy, *et cetera*.

The convulsion often lasts from fifteen minutes to one hour, and terminates suddenly; but the patient may lapse into a condition of somnolence or trance, and remain so for hours, days, or months.

The more permanent symptoms, or stigmata, which come on with or without a convulsion, are legion.

In the motor field, we find represented almost every form of organic paralysis. A hand, an arm, or a leg, two limbs, or one side of the body, may be paralyzed. In that form of hysteria in which one half of the body is paralyzed (hemiplegic), the face muscles are not affected as they usually are in true paralysis of one side of the body. In these paralyses, the loss of power is not so absolute as in the true forms. The muscles do not waste. Violent, sustained contraction of any muscle or group may persist for months or years. These "contractures" occur oftenest in the upper extremity. The arm is bent at the elbow and the wrist, and the fingers are tightly clenched over the thumb, which lies in the palm of the hand. Continuous agitation or tremor of the hand and the arm is common. The usual disorders of sensation are loss of feeling (anæsthesia), hypersensitiveness, and pain. The anæsthesia is absolute, and often affects half of the body, ceasing abruptly at the midline, but it may involve only a hand or a limb.

The breasts and the ovaries are hypersensitive, and tender spots occur over the abdomen, the chest, and the back. There is complaint of neuralgic pains in the head, the neck, the back, and the pelvic organs. The digestive system suffers derangement, which is evidenced by perversions of taste, loss of appetite, difficult swallowing pain, and incessant gagging or vomiting. Emaciation may be extreme.

Disturbances of respiration are manifested by loss of voice, persistent hicough, difficult or very rapid, jerky breathing, and a dry, purposeless, barking cough.

The heart action is rapid, and the patient may suffer from palpitation and anginoid attacks of pain in the chest. Hysterical flushing of the face and the neck, with profuse local or general sweating, may occur.

In many cases, the mental condition borders closely upon insanity. Prevarication is the rule, and the individual's word cannot be accepted upon oath. A melancholic bent of mind develops, and a true disease or disorder of the mind may follow, with suicidal tendency.

Treatment: Treatment cannot be instituted too early. Sensitive, nervous children should be removed from the city to the country. Special emphasis should be given to the training of

their physical powers. Life out of doors, with freedom from nervous strain and mental excitement, is most desirable. These children should not be sent to school until they are ten or more years of age. They should be taught at home and carefully trained in habits of self-control. Congenial, graduated, useful employment should be planned for them. The element of competition at school would thus be removed; their bodies would be developed, and their will power would be strengthened.

A simple, liberal, nourishing diet of fruits, entire cereals, milk, eggs, and fresh vegetables will combat constipation and improve the quality of the blood.

After the diseased condition is established, more vigorous treatment is necessary. Partial isolation, and complete separation from sympathizing relatives and friends, with absolute rest in bed for a time, and a tactful nurse are necessary to satisfactory progress.

Harsh and unkind measures should be avoided. The patient should be impressed with the undignified slavery into which she is sinking, and should be constantly encouraged to make powerful efforts to resist the mental storms. The mind must be directed

away from the affected parts, and the patient assured that with her coöperation, she will entirely recover.

A daily tepid bath for fifteen or twenty minutes will favor elimination and tend to induce sleep. During the period of rest in bed, a daily massage will aid circulation and nutrition, and will take the place of active exercise.

WRITER'S CRAMP (OCCUPATION SPASM)

A "professional spasm" is a nervous affection characterized by painful cramp, weakness, or tremor in the hand or the arm, caused by continuous or excessive use of certain muscles.

Writer's cramp is the most common form. It occurs more frequently in men of a nervous constitution, who are given to



An out-of-doors life is the best cure for hysteria.

intemperance and excessive worry, and whose occupation requires continuous use of the pen.

Other types of occupation spasm occur in musicians, telegraphers, milkmaids, tailors, weavers, watchmakers, *et cetera*.

Symptoms: The attack comes on gradually, with a feeling of weakness and stiffness in the affected muscles. Numbness, soreness, or actual pain may occur in the hand and the arm. After a time, the usual occupation becomes impossible, because of the spasm or cramp that occurs in the involved muscles when the accustomed movements are attempted. The moment the pen is taken, spasmodic, involuntary contractions begin in the thumb and the forefinger, making it impossible to coördinate the movements necessary for writing. The cramp may be due to faulty methods in writing,—gripping the pen too tightly, pressing too hard upon the paper, or using the little finger or the wrist as a fixed point.

As a rule, the patient experiences no difficulty in the use of the hand for other complex movements. The disease may be chronic, and last a lifetime.

If treated in time, correction of the faulty position, rest, and massage of the affected muscles may bring about a cure. A change of occupation may be required.

INSOMNIA

Insomnia is inability to sleep. It is a very common complaint, and causes more suffering and concern than any other symptom except continuous pain.

Sleep is a necessity. Its value is equaled only by that of food. While awake, the brain and the nervous system are constantly active. Every thought, every movement, every object seen, and every sound heard imposes a tax upon the nervous system. Only while we sleep do the brain and the nerves cease their activity, and rest. Sleep is nature's sovereign remedy for the wear and tear incident to daily life. There is no fixed amount that will meet the requirements of everyone. The young must have more sleep than the aged. Every adult should have eight hours; nine or ten hours are required by some.

Causes: The causes of poor sleep are many, among which prolonged or excessive mental strain, especially in the evening, takes first place. When heavy mental labor is continued to a late hour, the brain becomes congested and its cells vigilant.

At the present time, the nervous temperament predominates; and many have, through overwork, anxiety, worry, and the excitement of the daily press and the movies, approached near to the edge of nervous bankruptcy. When, upon retiring, the

mind is wrought up almost to snapping tension, with worries and plans wildly chasing one another through the brain, sleep is tardy and disturbed.

Often bodily discomfort from indigestion, pain, fever, or cold extremities, is the cause of insomnia. It is a mistake to take a heavy meal just before retiring. If wakeful, remain quiet and relaxed and do not worry. Fretting and tossing increase the wakefulness, and rob the body of that which is second best—that is, rest.

Bright's disease, high blood pressure, anæmia, neurasthenia, and insanity contribute their quota to the causes of poor sleep.



Strenuous exercise, such as sawing wood, is an excellent cure for sleeplessness.

Advanced heart disease, by interfering with respiration and the circulation within the brain in the lying posture, often prevents sleep. Persons thus afflicted rest better if made comfortable in the sitting posture, in an armchair or a rocking-chair.

Toxic, narcotic drugs, such as alcohol, tea, and coffee, while masquerading as nerve sedatives, are potent causes of wakefulness.

Treatment: Sleep is natural, physiological. There is a cause for insomnia. Removal of the cause may be sufficient treatment. The sleeping room should be cool, well ventilated, and free from light and from disturbing noises. Secure a comfortable bed, and let the covering, preferably blankets, be light but warm. The evening meal should be light, and taken at least three hours before retiring. Healthy fatigue from physical labor in the open air

will prepare for restful sleep. "The sleep of a laboring man is sweet, whether he eat little or much."

Avoid tea, coffee, and all sleep-producing drugs. A hot food drink, such as milk, malted milk, or soup, taken upon retiring, will often prove helpful.

Hydrotherapy is the ideal sleep producer. A hot foot or leg bath at bedtime will bring the blood from the congested brain to the cold extremities, and may induce sleep. A neutral bath in the evening, at 96-98°, for twenty minutes, with a cold compress to the head, is a valuable procedure. Two or three mild fomentations to the spine, with heat to the feet and a cold compress to the head, is a good sedative treatment.

The full wet sheet pack given in the evening, wrung from water at a temperature of 90°, and continued for thirty minutes, is excellent. The temperature of the water may be reduced daily five degrees, and the time increased five minutes, till a temperature of 60° is reached, and a duration of one hour.

The moist abdominal binder, or Neptune girdle, wrung from water at 65° and well covered, is a good sedative, and should have a trial.

A cool morning spray or a cold sponge bath, or, when possible, an electric light bath for eight minutes, followed by a cold shower and vigorous rubbing of the skin, will tone up the nerves, favor elimination of waste, and improve the general health.

EVILS OF DRUGGING

Drugs, it is true, will produce sleep. They are potent, but their action is fleeting and dangerous. They cannot and do not relieve anxiety, care, and worry, and produce real, refreshing slumber. Not one of them invades the realm of the *cause* of the worry and the insomnia; and in only too many cases, they aggravate the primary and basic difficulties. They only mask and submerge symptoms, whereas if they had any inherent worth, they would bring the hidden things to light. Drugs should not be used in combating insomnia.

RAILWAY SPINE (TRAUMATIC NEUROSIS)

Railway spine, or railway brain, is a morbid condition of the nervous system due to shock following an accident or injury, as in a railway wreck. Bodily injury is not essential to the development of the neurosis, but only a profound mental impression.

Symptoms: The symptoms may appear at once following the shock, or may be delayed a week or more. The condition is a form of neurasthenia or hysteria, and may partake of the symptoms of both. The individual becomes emotional, introspective,

and despondent, and dwells constantly upon his condition. He complains of headache and of pains in back and limbs. Numbness, tingling, and motor or sensory paralysis may develop in one extremity, or may involve an entire half of the body. Spells of violent trembling are common.

Recovery may be expected in a majority of cases, and the treatment is the same as that outlined for neurasthenia and hysteria.

HABIT SPASM (SPASMODIC TIC)

A tic or habit spasm is a quick, involuntary, convulsive contraction of a group of muscles physiologically related. It occurs oftenest in the muscles about the eye or on the side of the face.

Everyone has seen individuals who repeat at irregular intervals some peculiar spasmodic facial contortion. It may be a sudden grimace, a rapid closure of an eyelid, a drawing of the mouth to one side, or a sniff. It may take the form of a shrug of the shoulder, a gesture of the hand, or a jerk of the head.

These various tics occur in neurotic individuals, but often begin with some form of reflex irritation, as eyestrain or a nasal disorder. In children, they are usually transient; but in adults, they may become firmly fixed, and persist throughout life.

Treatment consists of general hygiene, mental therapy, and removal of any source of local irritation.

HEADACHE

Headache is not a disease, but a symptom which may signify only a dietetic indiscretion, with a resulting sluggish liver, and toxæmia (poisoning) of stomach and intestinal origin; or it may indicate the presence of some serious malady, such as abscess or tumor of the brain.

For convenience, we may classify headaches as intracranial (that is, those arising from disease conditions within the brain or its covering membranes) and extracranial (those resulting from disease in other parts of the body).

Intracranial Headaches. In this group belong brain tumors, brain abscess, brain syphilis, and meningitis.

The headache in tumors of the brain is severe, very persistent, and does not yield to treatment. It is associated with dizziness, attacks of vomiting, unsteady gait, and local or general convulsions. As the disease advances, the pupils dilate, and there is progressive loss of vision, with drowsiness and mental impairment.

In abscess of the brain, the headache is very severe, and has a deep boring, penetrating character. If not relieved, the patient may soon become unconscious. It occurs usually in a child or

young adult who is acutely ill, with sore throat, earache, fever, rapid pulse, vomiting, and sweating. The infection begins in the throat, and spreads to the ears (which may discharge a foul smelling pus), and from the ears to the brain.

The headaches of brain syphilis are severe, persistent, and tend to be worse at night. They are commonly associated with failing mentality and general physical decline. The pupils are of unequal size, the eyes squint, and an eyelid may droop. These patients often have convulsions, followed by a transitory or permanent paralysis of part of the face or a limb, or the loss of speech. These headaches clear up promptly under appropriate antisyphilitic treatment, which must be administered by a physician.

Meningitis presents as one of its most annoying symptoms, an atrocious pain at the base of the brain, which causes the child to "cry out" at intervals. The acute onset of this disease in childhood or youth, with high fever, pronounced stiffness of the muscles of the neck, back, and limbs, with retraction of the head, crossing of the eyes, skin rash, semiconsciousness, and convulsions, makes the diagnosis clear.

Extracranial Headaches. (a) Eyestrain is a common cause of headaches that occur in the frontal region. They come on with excessive use of the eyes, and disappear with rest and sleep. These may be permanently cured by wearing glasses that correct the errors of refraction. (b) Infection of the cavities or sinuses of the upper jaw and the frontal bones of the face is associated with a constant frontal headache, worse in the morning, and not relieved by sleep. (c) Focal infection headaches are very common, being caused by abscesses about the roots of teeth, pyorrhea, unerupted molar teeth, and diseased tonsils. (d) Metabolic or constitutional headaches arise from toxæmia or poisoning occurring in Bright's disease of the kidneys, diabetes mellitus, chronic arthritis, tuberculosis, and arteriosclerosis, from the retention of nitrogenous materials or waste products within the blood, or the formation of foreign acids.

Headaches of gastrointestinal origin form a large group. Often the sufferers are large eaters and take little physical exercise. Excessive sweets are particularly prone to engorge the liver. The patient has a coated tongue and foul breath, is annoyed by attacks of dizziness, and has a sallow complexion. There is considerable gaseous fermentation and bloating. The stools contain much undigested starch and fat. They show gas bubbles and are very offensive. The individual is drowsy and tends toward the obese type.

Among the leading causes of headaches must be mentioned the toxic action of the alkaloid caffeine, which is consumed in large quantities in the popular beverages, tea and coffee, and in a number of so-called soft drinks.

Patients with nervous exhaustion suffer from annoying pains in the back of the head and neck. The sovereign remedy for these headaches is freedom from nerve strain,—life in the open air, with a maximum amount of sleep, and a substitution of physical activity for mental labor. Disturbance of the glands of “internal secretion,” notably the thyroid gland, which becomes enlarged in exophthalmic goiter, the pituitary gland, at the base of the brain, the adrenals, located above the kidneys, and the ovaries, all of which are concerned with the regulation of nutrition, is frequently the cause of toxic headaches.

TREATMENT OF HEADACHES: Avoid headache powders and patent medicines, many of which are dangerous, and which at best only temporarily smother the symptoms. If possible, ascertain the cause and remove it. This may be the only treatment required.

Carefully consider the diet. Eat moderately and at regular intervals. Reduce to a minimum the quantity of sweets; avoid the caffeine beverages, tea and coffee, also tobacco and alcohol in every form.

Correct existing eyestrain with proper lenses, and have infected teeth, sinuses, and tonsils cared for. Maintain a proper balance between rest, sleep, and physical exercise. Keep the bowels free by proper diet, and simple laxatives, if necessary. In case of earache or severe illness as indicated, associated with headache, consult a good physician at once.

MIGRAINE

Migraine is a hereditary nervous affection characterized by periodic attacks of severe headache, often associated with nausea, vomiting, and disturbances of vision.

Causes: Heredity must be assigned first place as the cause. The disease is frequently seen in several successive generations, being transmitted through the maternal parent. Most of the cases occur in women, and begin early in life, often from five to fifteen years of age.

Certain reflex causes are believed to precipitate the attacks, such as toxæmia from disordered digestion, disturbances of menstruation, eyestrain, enlarged tonsils, adenoids, decayed teeth, and nasal polypi. Extreme mental or bodily fatigue may be the exciting cause. A striking peculiarity is the periodicity

of the attacks, which may come the same day of the week, once in two weeks, once a month, *et cetera*, throughout life.

Symptoms: Certain warning symptoms make it possible to recognize an approaching attack. The patient feels languid, drowsy, and may be nauseated. There is blurring of vision, with flashes of light and spots before the eyes. The pupil on the affected side may undergo rapid, spasmodic contraction and dilatation. Numbness, tingling of the face, and temporary loss of speech are not uncommon.

The headache begins on one side, at a definite point, as the eyeball, the temple, or the forehead, from which it may spread to the entire cranium. It is commonly associated with dizziness, nausea, and vomiting. The face is at first pale, and later becomes flushed. The pain may become so severe as to cause mental confusion and temporary unconsciousness. There is great prostration, and the patient is totally incapacitated from one to three days.

Treatment: The disease is incurable, but the attacks may be modified in frequency and severity by appropriate treatment. Reflex irritation from eyestrain, bad teeth, and tonsils should be eliminated. The diet is of great importance. The meals should be taken at regular intervals, and great care exercised to avoid excess of food. The diet should be simple, preference being given to fresh fruit, leafy and other vegetables, entire cereals, and dairy products. Rich foods, fried foods, pastries, meat, condiments, tea, and coffee should be avoided.

During the attack, the patient should be kept at rest in bed, in a quiet, airy, darkened room.

The bowels should be cleared by a laxative and colon flushing. It would be well also to wash out the stomach.

Drugs to kill pain are dangerous; and if required, they should be taken only upon the advice of a physician.

MENINGITIS

Meningitis is an inflammation of the covering membranes (meninges) of the brain and spinal cord. The condition is practically always caused by disease-producing germs that gain access to these membranes. These germs are most frequently those of syphilis, pneumonia, tuberculosis, epidemic meningitis, and the pus-producing organisms, and occasionally the germs of typhoid fever. The germs of scarlet fever, diphtheria, mumps, and measles do not infect the nervous system; but the poisons they generate sometimes cause an irritation known as *meningismus*, which is not a true meningitis.

Tubercular meningitis is caused by the tubercle bacillus, and generally occurs secondarily to tubercular infection elsewhere. It attacks the patient most frequently between the ages of two and ten years. Under six months and in old age, the disease is almost unknown.

Causes: Lack of proper food, and unhygienic surroundings and living quarters, play an important rôle in the spread of the disease. Injury is another causative factor. A blow upon the head or over the spine may favor the growth of the germ when it is already lying dormant in the brain and cord tissues. Tubercular infection of bony parts of the spinal column often extends to the cord, thus setting up a meningitis.

The coverings of the brain become very thickly dotted over with little bodies about the size of millet seed, and other inflammatory changes in the membranes occur.

Symptoms: Some of the prominent symptoms are headache, fever, stiff neck, disturbance of the pupils and the movements of the eyes, delirium, and unconsciousness. These symptoms come on rather gradually. The course of the disease is several weeks as a rule, and the sufferers practically always die.

Treatment: This should include keeping the bowels open with enemas, water treatments for reducing the fever, and cold applications to the head and neck. In such a serious condition, a physician should of course have charge of the case.

Epidemic meningitis is a condition very similar to that just described. The essential difference is in the cause, and the death rate is also less.

Cause: Epidemic meningitis is caused by a germ called the diplococcus intracellularis of meningitis.

Treatment: In addition to the treatment mentioned under tubercular meningitis, the Flexner serum treatment should be given by a physician. The earlier the treatment can be begun, the better the prospect of recovery. The outcome of the disease is more hopeful than that of tubercular meningitis. In epidemics where the modern treatment with the Flexner serum has not been used, from fifty to eighty per cent of those attacked have died. (See chapter 1.) Where the serum treatment has been used, the death rate has been reduced to about twenty-five per cent.

ENCEPHALITIS

Encephalitis is another inflammatory condition affecting the central nervous system. The germs in this case are generally the pus-producing organisms. The symptoms are quite similar to those of tubercular meningitis. The treatment also is the same.

Brain abscess may be a complication of encephalitis, just mentioned, or it may occur through infection from the ear, or from injury to the head. The abscess may occupy any part of the brain. The location largely determines the symptoms. An abscess located in the back portion of the head causes very different symptoms from those caused by one in the front portion of the brain.

Symptoms: The general symptoms are headache, a fluctuating temperature, rigors, sweats, vomiting, dimming of eyesight, plus local symptoms depending upon the location.

Treatment: The treatment of a brain abscess is surgical. An opening is made in the skull, the pus is let out, and drainage is introduced. Nature repairs the process, and restores as much function as possible. To prevent brain abscess, all ear, nose, and throat conditions should receive attention before complications have time to develop.

Encephalitis Lethargica. Another form of encephalitis is called, for want of a better term, *encephalitis lethargica*. The name is very misleading, as it implies that the predominating symptom is a sleepy or lethargic condition, while the fact of the matter is that a great many of these patients have symptoms of excitement. The disease is known as sleeping sickness by the laity. This form of encephalitis has come into prominence within the last four or five years. It seemed to follow the influenza epidemic, and became just as widespread in its scope as the "flu." However, more recent investigations seem to discredit any relation between the two diseases. It is evidently a germ disease; but beyond this, little is known of it. Occasional cases are found here and there at all times; but in addition to being endemic in localities, it occurs in epidemics.

Symptoms: The symptoms in the early stages are languor, headache, vomiting, fever, difficulty in swallowing, a sleepy, inactive state or quite the reverse. Vision is dim. In fact, any of the special senses may be involved.

Treatment: The treatment is similar to that for meningitis.

INFANTILE PARALYSIS

This disease occurs in epidemics. The age most liable to it is the period between the ages of six months and ten years. Under six months, infantile paralysis is almost unknown. The seasonal occurrence in the Northern Hemisphere is August, September, and October.

Symptoms: The symptoms are pain on handling the limbs, nausea and vomiting, peevishness and restlessness, weakness of

groups of muscles, with wasting. Later, as a result of the paralysis, there is deformity, and some, if not total, inability to walk. It will be noticed that the child does not move one part as freely as the corresponding part on the other side.

The outcome depends upon the severity of the paralysis. If the paralysis has been extensive, full restoration to function is doubtful; yet we can always look for improvement.

Treatment: In the treatment of the disease, the patient should be isolated. Excreta, and nose and throat discharges, should be destroyed. City boards of health keep a serum for use in the treatment of the disease, and advantage should always be taken of this course of treatment. Rest, enemas, sponging, and later massage, passive and resistive movements, hydrotherapy, electricity, use of splints, and correcting the deformities by surgical procedure, are the recognized forms of treatment.

SYPHILIS OF THE NERVOUS SYSTEM

Syphilis of the nervous system is caused by the germ *trepone* *pallida*, invading the central nervous system. The disease groups itself into three general classes; namely, interstitial, tabes dorsalis, and general paralysis of the insane. (See chapter 71.)

Interstitial syphilis generally means a more recent infection by the germ, and holds out more hope for treatment.

Symptoms: The symptoms appear about five to ten years after syphilis has been contracted. The deeper structures have not become involved. The blood vessels and the meninges alone are implicated. The symptoms are those of a chronic meningeal infection. In its very early stages, it is often diagnosed as neurasthenia, thus allowing the syphilitic process to progress until all hopes of improvement by any method of treatment have vanished. The patient becomes generally nervous, cannot sleep, lacks ambition, is fatigued easily, and a little later shows some local palsies, like those connected with the muscles of the eye, double vision, or involvement of the muscles of the face. A biological reaction of the blood and cerebrospinal fluid (called the Wassermann test) is positive. The outcome of this form of the disease is quite favorable.

Treatment: The prompt and persistent use of some one of the arsenical preparations like neosalvarsan or salvarsan will clear up the effects of the invading germ, and avert the later sequela generally attending the disease when it is left untreated.

Locomotor Ataxia (*Tabes Dorsalis*). This is a condition of longer duration and less amenable to treatment than the type just

described. The disease is first noticed about fifteen to twenty years after syphilis is first contracted.

Symptoms: Sharp, shooting pains in the legs, worse at night, with periods of relief; crises connected with the stomach, manifested by vomiting and severe pain, are evidences of the inroads of the disease into the nervous system. The patient sometimes feels as if he were walking on cotton, felt, snow, or some other soft material. He loses his balance easily. The sight becomes dim, and blindness may occur. If, however, blindness is a prominent feature of the case, the patient is not so liable to become useless on his feet.

Treatment: The treatment consists of the injection of the arsenical preparations into the blood current or the cerebrospinal fluid, or both. The outcome from treatment is not favorable, yet the advancing process can sometimes be made stationary and held in check for a time.

General paralysis of the insane, another form of syphilis of the nervous system, puts in an appearance and shows itself in symptoms about twenty to twenty-five years after the first entrance of syphilis into the system. Here the deeper structures of the brain have become involved. This fact has been conclusively proved by the finding of the germs deep within the structure of the brain.

Symptoms: The early symptoms are twitching of the corners of the mouth. The patient finds difficulty in the execution of the finer movements, like buttoning of the coat. The hands become shaky, so that writing is very difficult. If one who has been neat in appearance, careful in business transactions, and maintained a high standard of morality, becomes careless of his appearance, allows his clothes to be spotted up with food, becomes profane, starts the use of liquor and tobacco, desecrates the marriage ties, and becomes reckless in business adventures, he is almost certain to be one who is in the early stages of the disease. Later the patient sees imaginary objects of one kind or other, and hears imaginary voices. He becomes suspicious of his wife and closest friends, and feels that they are planning and plotting to do him evil. He feels that his food is poisoned, so refuses to eat. He sometimes becomes violent, and attacks his attendants, or tries to jump out of a window and escape. Eventually paralysis sets in, and he becomes gradually weaker, until about two years after the appearance of symptoms, he succumbs to the disease. The outcome from the start can be considered very unfavorable.

Treatment: The treatment is similar to that of tabes, but less can be expected from it. The ideal treatment of these cases is best carried out in special institutions for their care.

BRAIN TUMORS

Tumors of the brain are of many varieties, and may be located in any part of the organ.

Symptoms: The symptoms of tumor of the brain are of two classes; namely, *general* and *focal*. The general symptoms are severe, persistent headache, which may be in the region of the location of the tumor; vomiting, not preceded by nausea; dizziness, convulsions, and progressive loss of sight. These symptoms are caused by an increase of pressure within the cranium. Mental deterioration is another general symptom, but becomes a focal symptom where the tumor occupies the front portions of the brain, where the intellectual center is located.

The *focal symptoms* of tumor depend upon the location of the tumor, and correspond to the part destroyed by the tumor by pressure or by degeneration. If the tumor is situated on the side of the brain, a disturbance in speech, and a paralysis of motion and possibly of sensation in the arms and legs on the opposite half of the body, are manifest. Tumor in the back part of the brain brings about blindness; and if it is located low down on the side, the centers of hearing, smell, and taste will be involved. Should it be located in the brain stem, that portion connecting the brain and the spinal cord, the cranial nerves will be affected, causing the patient to see double. He will have difficulty to chew and to swallow. The face may be turned to one side, or the tongue may lie lifeless on the bottom of the mouth, as these are all signs of cranial nerve involvement. Should the hind-brain, or cerebellum, be involved, the function of correlating the movements of different groups of muscles to one common purpose or object is destroyed, and the patient overshoots the mark in any movements that he tries to put into execution.

The implication of the inner ear causes a disturbance in the equilibrium. The war has made this question a live issue in connection with the examination of recruits for aviation. It is the vestibular apparatus in the internal ear, with its connections, that keeps us informed as to our position in space.

Treatment: The treatment of tumor of the brain is surgical in nature, and what can be accomplished depends upon the kind of tumor and its location. If the tumor is one that only presses upon the parts and is in a location where it can be reached, brilliant results follow operation; but if the tumor has destroyed vital structures and is located where it is difficult of access, the

ultimate outcome is hopeless. Yet, even these cases can be relieved by lowering the intracranial pressure by the withdrawal of the cerebrospinal fluid from the brain cavities. Surgery of the brain and cord has been brought into disrepute because of meddlesome surgery of this region.

TUMORS OF THE SPINAL CORD

These fall into two classes,—those growing outside the cord, and those growing within the cord substance. Both kinds of tumors are within the spinal column cavity, and they differ only in their relation to the cord.

Symptoms: The early symptoms of these two classes differ, in that a tumor outside the cord gives early and severe pain, while a tumor within the cord abolishes the sense of pain, heat, and cold on the side of the body opposite the lesion or tumor. The later symptoms of cord tumors are like those produced by completely severing the cord. Some of these are involuntary movement of bladder and bowels, stiffness and difficult walking, which increases until the patient is bedridden. The disturbance in pain and temperature increases, inflammation of the bladder sets in, and eventually the patient dies of intercurrent disease.

Surgery offers excellent success in tumors outside the cord, but those inside the cord are less hopeful. A part of the bony protection of the cord is chiseled away until the cord is brought in view and the tumor is shelled out.

SHAKING PALSY (PARALYSIS AGITANS)

This is a nervous disease that often comes on late in life.

Symptoms: The most prominent symptom is a tremor or continuous shaking movement of the hands, and sometimes of the head. There is also a peculiar manner of walking with the body leaning forward and apparently about to fall forward. A peculiarity of the movements of the hands is that they do not interfere greatly with common useful movements of the hands. For instance, a patient whose hands shake very badly may be able at will to put a glass of water to his lips without difficulty or spilling the water. The movement of the fingers and thumbs is often described as a “pill rolling” movement.

Treatment: Little can be done in the way of a cure. The best line of treatment is that obtained in a well conducted sanitarium.

OTHER DISEASES

There are several other well defined but less common diseases, accompanied by and caused by structural changes in the brain and spinal cord; but on account of their comparatively infrequent occurrence, they will not be considered here.

Feeble-Mindedness

There has been a rapid increase and wide dissemination of knowledge concerning mental defectives in recent years. In the present state of knowledge of the subject, such well formed and comely appearing and bright acting persons are included in the class, that one wonders how much we have to know, how much we must feel and understand, how strong must be our will, how much we must be able to do intelligently, in order to be permitted to remain in the class considered mentally normal.

Intelligence, in a practical sense, has been said to mean "all those essential mental processes in such proportion as to render the possessor able to adapt himself to his environment." English authorities have declared that the line between the feeble-minded and the normal person is marked by "that degree of intelligence below which the possessor cannot manage himself or his affairs with ordinary prudence."

What affairs it may be necessary for one to control, and what "ordinary prudence" means, is largely determined for an individual by his age and his environment. Whether he is to be considered intelligent or unintelligent, therefore, depends upon whether his mind has developed with his years—that is, whether his intellectual age and his chronological age have advanced together—and upon the kind of community in which he lives.

After much study of those whose inferior intelligence has made them unable to compete with their fellows in the struggle for existence, and unable to meet satisfactorily the social requirements of their environment, it has been generally agreed *to call all adult persons feeble-minded who do not arrive at an intelligence higher than that of a twelve-year-old normal child.*

Where mental development has been arrested after the age of twelve years, the individual seems to be able to take care of himself, though he may be generally regarded as of very ordinary intelligence. Authorities have pointed out that it must not be inferred that persons of only a ten-year-old intelligence cannot function in any environment, any more than that those of a fifteen-year-old intelligence can function in every environment. Many feeble-minded persons with an eight-year mentality, or beyond, well supervised and protected in good homes and simple communities, with opportunities for activities suited to their

capacity, have been observed living fairly useful and orderly lives outside institutions provided for the special care of this defective class.

AVERAGE INTELLIGENCE

Tests given the soldiers of our national army seemed to establish the fact that the average soldier possessed the degree of intelligence, the native capacity for understanding, feeling, and will power, which one finds in the normal youth between thirteen and fourteen years old.

If at first thought the reader is surprised at such a finding, and inclined to question it, let him remember that mingled with many of superior and ordinary intelligence, there were several hundred thousand men who lacked sufficient mental capacity to afford them curiosity and ambition and intellect enough to learn to read and write. Then, too, he must consider that this average soldier, with his greater physical development, his more complex relations and wider experience, had possessed for ten years or more this thirteen-year-old intelligence, with time to learn to do understandingly many more things than any normal thirteen-year-old boy has time to learn during the one year that he remains at this intellectual level. Such a man, too, has had time to learn, with training and drilling, and under supervision, to do automatically, just as any child can do, many things he does not do intelligently, or with understanding. But this man of average intelligence will not learn to do understandingly anything that the normal thirteen-year-old boy cannot comprehend and do unless his physical immaturity is too great a handicap. When we remember that the average man lives for thirty years or more after his intellectual capacity ceases to increase, we can better understand how the average person seems to know more than the normal youth between thirteen and fourteen years of age.

Army officers claimed that useful soldiers could be made of men who were tractable, of as low a mental level as ten years. With supervision, they did well with the drudgery of camp life; but they contributed largely to the awkward squads, the petty offenders, and the like, and wise commanders took pains to eliminate them from their commands before going overseas. Many of these grown-up children were simply wrecked by a few months of military life in this country.

If the consideration of these facts suggests to our minds how many there are whose mental capacity fails to develop beyond that of mere children, we may get a glimpse of the predisposing cause of many cases of pauperism, inebriety, sexual irregularity, and of the faults and failures of many ne'er-do-wells.

MENTAL LIMITATIONS

In a general way, recognition has been given the fact that a person can never be trained to do intelligently any task the doing of which requires intelligence of a higher level than that to which he has attained.

We have always admitted that a man may make a good carpenter or a successful manufacturer and still be doomed to failure should he undertake to function as a statesman. How often the public has sympathetically concluded that "the job was too big for him," when it has witnessed the failure of some earnest, energetic man! We are loath to admit, however, that there may be some things beyond normal persons; that although there may be a will, there may not be a way.

We were a long time in comprehending why so many youths lost interest in high school studies, which were really too much for them. Just as slow were we to understand why some men, pushed through college by hopeful and ambitious parents, with the aid of a dispensation of grace on the part of friendly teachers, and started off on a career chosen for them by others, have failed at everything until they have settled down to the kind of life and occupation that can be served with the grade of intelligence with which they had been naturally endowed. In the parable, the man with one talent was not reprimanded because he failed to make his one talent ten talents, or five, but because he failed to make the best use of the one given him. We can only expect men to do as much, with the mental capacity given them.

Teachers of the feeble-minded have demonstrated the absolute impossibility of teaching an imbecile with a mentality of four years to do things that can be done only by a child with a mentality of six or beyond. They succeed in making defective children happier and more useful, not by trying to make them learn the things that more fortunate boys and girls may enjoy studying, but by training them to do with their hands, and to exercise their childish talents upon, the tasks that their capacity enables them to understand, and by drilling them in useful habits.

Children who begin to fail to keep up with the book work of the public schools ought to have special attention paid to their manual training, to their talent for art or music, and to the encouragement of their interest in the applied sciences, as is done in many of our best schools since mental limitations have been appreciated.

That man is surely fortunate who neither is born into nor gets into an environment requiring more intellectual capacity

than he possesses, for only thus can he avoid the dangers of failure or delinquency.

MEASURING INTELLIGENCE

At one time, teachers of the feeble-minded were hopeful of training the defective child along very much the same lines as the normal child, except that they recognized the need of getting down to different methods of approach in starting their pupils on the road to learning. After using the try-and-see method for estimating intellectual capacity, they classified as—

Idiots, those who could not be trained at all;

Imbeciles, those who could be trained to self-help, or to help others;

Feeble-minded, now called *morons*, those who could learn to read and write.

Binet-Simon Test. In 1908, Binet and Simon offered a series of questions and problems which they had found could be properly answered and solved by the normal child at the various ages and the accompanying mental levels between the years of three and twelve. This proved to be a marvelous measure of the intelligence of the child, and enabled teachers of the feeble-minded to compare the intellectual levels of these children, whose intellects range from one to twelve years, with those of normal children. The tests are based upon the developing power to pay attention to what one sees and hears and feels, and to remember; upon the development of the capacity to understand and obey commands, to use language, to exercise the imagination, and to do abstract thinking. The development that a normal child makes without school training, but merely as the result of his natural curiosity and his contact with persons and with things, suffices to enable him to meet properly the tests for one of his age. In the hands of highly trained persons, the Binet-Simon test has proved wonderfully accurate, and makes it possible to classify defective children rather closely into those who are like normal children of one year, two years, three, four, *et cetera*, up to twelve.

Having determined the level of intellectual capacity of a mentally defective person, and knowing (what experience has taught) that a child of such a level can learn if well trained, we know what to expect of him, and along what lines to continue his training.

Since institutional records have taught us what the feeble-minded of various intellectual levels are able to do with understanding, one can roughly estimate the mental age of a defective who has been well cared for at home, by comparing what he can

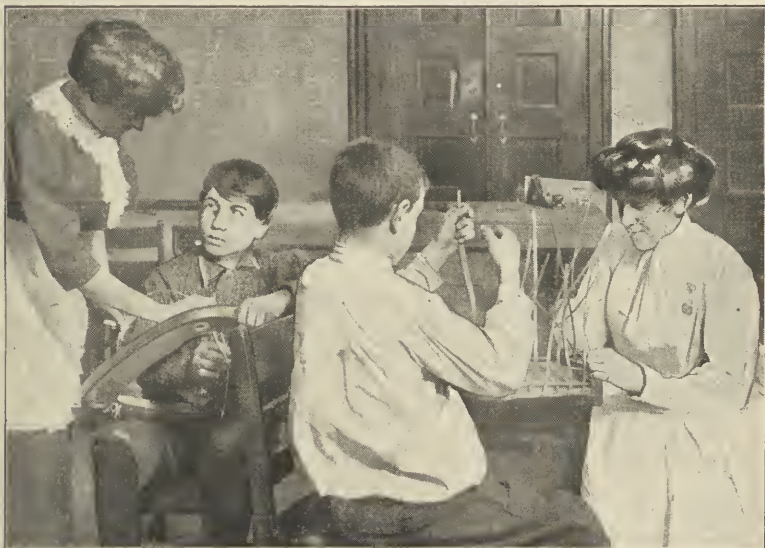
do with that done by idiots, imbeciles, and morons of the different grades, in training schools for such persons. Herewith is printed Dr. H. H. Goddard's industrial classification chart, for reference.

INDUSTRIAL CLASSIFICATION

MENTAL AGE	INDUSTRIAL CAPACITY	GRADE	
Under 1 year	a. Helpless. b. Can walk. c. With Voluntary regard.	Low	Idiot
1 year	Feeds self. Eats anything.	Middle	
2 years	Eats discriminatingly (food from non-food).	High	
3 years	No work. Plays a little.	Low	Imbecile
4 years	Tries to help.		
5 years	Only simplest tasks.	Middle	
6 years	Tasks of short duration. Washes dishes.	High	
7 years	Little errands in the house. Dusts.		
8 years	Errands. Light work. Makes beds.	Low	Moron
9 years	Heavier work. Scrubs. Mends. Lays bricks. Cares for bathroom.		
10 years	Good institution helpers. Routine work.	Middle	
11 years	Fairly complicated work with only occasional oversight.	High	
12 years	Uses machinery. Can care for animals. No supervision for routine work. Cannot plan.		

Our graded schools furnish another method for making an approximate estimate of the intellectual age of those whose development of brain and mind has ceased between the ages of six and thirteen years. Long experience has determined what studies should be placed in the eight grades, so that an average normal child is able to find interest in them and grasp their meaning, at the proper year of his life for the different grades. Bright children may show a little advance, dull ones may be a year or so retarded. Due allowance must of course be made for ill health, lack of opportunity, and other hindrances beyond a child's control. Unless excused because of these things, any child who falls behind his class three years may be considered as a

victim of arrested mental development. That person who has had full school privileges, but who quits school at thirteen or fourteen years of age, feeling too big for fellow schoolmates, and having spent two years in the third grade, and two in the fourth,



Children who begin to fail to keep up with the book work of the public schools ought to have special attention paid to their manual training.

and having never been able to make a showing in the fifth grade, may be considered as definitely feeble-minded and of an intellectual level of an eight-year-old child.

If a child is retarded three years—if his mental age is three years behind his chronological age—authorities consider him as defective.

The interest in the subject of intelligence tests awakened by the introduction of the Binet-Simon test, led to many modifications and elaborations of the original. Tests for the mental ages beyond that of twelve years have been developed, so as to include the whole range of mental capacity in normal adults. Tests for occupational and professional adaptability, tests for various degrees of superior mentality, *et cetera*, have been devised; and they are of various degrees of reliability and value. Common sense has to be used in all kinds of scientific work, where one is dealing with human beings.

HOW TO HAVE THE TEST MADE

Among teachers and social workers, nearly every community has some intelligent person sufficiently acquainted with this test, or with some of its better modifications, to enable parents to get a fairly true idea of a child's mentality. Judges of juvenile courts, and physicians paying special attention to nervous and mental diseases, and officers of corrective institutions can usually refer one to a proper person to make the tests. The psychological departments of colleges and universities usually give considerable attention to this matter. Some states maintain a well organized bureau of juvenile research, where this test is made by experts.

DEFINITION AND CLASSIFICATION

Those persons are feeble-minded whose mental development along all lines stops at some time previous to adolescence. This arrest may not be sudden, but is usually a slowing down covering several years. Whenever a child has had in the past a better intelligence than he now possesses, it is probable that he suffers of a disease of the brain and not simply arrested mental development.

Some boys and girls of apparently normal intelligence, showing considerable ability, shrewdness, and even cunning, but lacking ability to adapt themselves to their environment, and to live a decent life in the society in which they are placed, who make up the so-called defective delinquents of to-day, have been called *moral imbeciles*. Unusually bad influences, mental conflicts arising from unpleasant home conditions, lack of proper training and discipline, render them apparently incapable of getting along in ordinary society. These, together with the higher grades of feeble-minded, make up a large part of the unfit. The term "intellectual imbecile" refers to those whom we have spoken of as *idiots*, *imbeciles*, and *morons*, in whom the intellectual development has stopped at twelve years or earlier. Reference to the industrial chart will show what levels of intelligence are possessed by the different grades.

When one outstanding anatomical feature is selected as a basis, idiots and imbeciles are sometimes referred to as *microcephalic* (small-headed) and *macrocephalic* (large-headed, including the hydrocephalic). Taking a number of associated anatomical features into consideration, we can set apart the *Mongolian* group and the *cretins*.

MONGOLIANISM

Mongolianism may be recognized in a defective child by its more or less close resemblance to the Asiatic countenance, with

its round, flat face; slanting eyes; short nose, forward-looking nostrils; a large, fissured, and often protruding tongue; red complexion; small, round head, with but little protuberance behind; short, stubby fingers; joints easily over-extended, *et cetera*. One has said that Mongolian imbeciles look so much unlike the average child that they all look alike. Mongolian children are supposed to be short-lived, though some live far into adult life. According to their mentality, they are usually imbeciles of the four-year-old or five-year-old level. In nearly all cases, they come from good families, where the heredity is good. Over half of the cases are the last born of a large family, suggesting a worn-out reproductive power on the part of the mother. Physical and mental shock seems to have taken place in some instances where they are not the last born. Scientists who have studied Mongolianism declare that "the sole and adequate cause is to be sought in the condition of the mother during pregnancy." Because we do not know just what causes the abnormal condition of the mother in such cases, how important it becomes for all prospective mothers to obey the laws of mind and body, to secure peace and a well nourished body!

Mongolian children are capable of learning to do the simplest tasks only, and time should not be wasted in trying to teach them reading and writing and counting, or even manual training. They are affectionate and agreeable children when made happy by those who understand them.

No medication, not even glandular therapy, has been found definitely beneficial in the treatment of this condition.

CRETINISM

While very rare in America, there were formerly in Central Europe a great many cases of arrested mental development showing pronounced physical characteristics, such as stunted growth, the stature of a child five or six years old; clumsy hands and feet; rough, thick skin; scanty and coarse hair; cold hands; stolid expression; upper eyelids thick; lower lids baggy; protruding, swollen lips; bad and irregular teeth; pads of fat above the collar bone; pendent abdomen; with or without enlarged thyroid gland. Cretins show various grades of mental enfeeblement. They are usually apathetic, timorous, and retiring. The voice has often a deep, guttural, harsh sound.

Thyroid gland administered to these cases ameliorates the symptoms of the disease in some instances, and the child approaches normalcy; and where fed early and continuously, it sometimes permits practically normal physical and mental de-

velopment. In most instances, cretins respond very little to training, a few learning to do simple tasks.

OTHER FORMS

Mere mention can be made of the fact that epilepsy may be associated with congenital feeble-mindedness, and that epilepsy in a child may cause a blotting out of certain mental processes, resulting in an apparent feeble-mindedness. Reference to the ancestry will usually determine whether the case is one of primary mental enfeeblement. Mental tests by experts will often reveal in subnormal children mental changes that point to the existence of latent epilepsy. Treatment should be directed primarily toward the epileptic condition, and the child should be trained according to its mental age.

Paralytic children in whom gross structural changes of the brain have occurred early in infancy, may show a mental defect that is wholly acquired, or partially natural and congenital. In either case, training and education should be directed toward correcting both mental and physical defects, training fit for the enfeebled mind, and muscular training and treatment, massage, exercises, and rest.

Ataxic children, and such as have Little's disease—a spastic condition caused by hemorrhage over the brain at birth—may show an inherited feeble-mindedness. Oftener they possess a fairly good mentality, but appear in an unfavorable light because of their inability to control their muscles of locomotion and expression and speech. Their ambition to learn to do things, and their determination to do something, are in striking contrast to the lack of interest and attention and persistence in the ordinary defective. Treatment here is directed toward the development of nerve-muscle control, and much can be accomplished. Brain surgeons have been experimenting with operative treatment for the removal of the products of hemorrhage, or relief of pressure in cases recognized and carefully diagnosed in the first year or two of life; but only competent surgeons, especially trained, should be thought of in such a condition.

Idiot savants, but rarely seen, show exceptional ability oftenest along the lines of mathematics and the arts, upon a background of low mentality. Carefully studied, these usually prove to be cases of dementia præcox, sometimes called adolescent insanity.

THE CAUSES OF FEEBLE-MINDEDNESS

All kinds of causes have been and are likely to be assigned to cases of idiocy and imbecility. When the defect is so pronounced in infancy that anyone would declare the defect con-

genital, all sorts of influences acting on the mother are assigned as causal factors. *The one outstanding cause in nearly two thirds of all cases is heredity, and the defect is one that is transmissible.* In nearly one eighth of all cases, a *neuropathic ancestry* is to blame. In such cases, among families full of instances of various brain and neurotic affections, some paralytic, epileptic, or otherwise diseased parent will produce offspring showing mental defect; and here the condition appears not to be transmissible. In nearly one fifth of the feeble-minded, *accidental causes* acting before, at, or after birth, and having nothing to do with one's antecedents, seem adequate to account for the condition. It is frequently impossible to find a probable cause for mental defect.

Heredity as a rule causes the same grade of mentality that is found in the parents. Unrecognized influences and accidental causes may lower the mental capacity of the offspring of defective parents, just as they may that of the children of normal parents. Imbeciles of a mentality under six rarely become parents, but those frequently do who reach an intellectual level of seven or above. The average hereditary feeble-minded person is a strong and fairly well developed specimen of physical man, without the capacity to develop understanding and other mental functions beyond that of a child. He seems to be a type of man whose mental limitations have been bestowed upon him, and who in turn will hand his inheritance down to his descendants. Treatment must be directed toward limiting reproduction among those who are too enfeebled to look after themselves, and toward the development of good habits, useful training, and the direction of effort among these mental defectives.

Accident. This implies a cause that might have been prevented. One cannot always be sure that some hereditary predisposition may not after all be a determining factor, whether the accidental cause operates before, at, or after birth. No accidental cause has ever been assigned to a case of feeble-mindedness, that has not been experienced by many who are normal. It seems natural to think that the capacity for development of the delicate nervous tissue could be influenced by the effects of disease and chronic intoxication upon the germ cells of the father or the mother, or upon the developing fetus. Goddard's study of 327 cases failed to show that alcohol, syphilis, or tuberculosis in either parent could be regarded as a sufficient cause of mental defect. Drunkenness and sexual immorality, however, are frequently found along with hereditary feeble-mindedness in the families of this class. Disease and poisons in the parent may produce

general weakness or death of the offspring, but do not seem to furnish alone the element for checking mental development at some certain age.

Meningitis is to blame for more than half the cases of arrested mental development to which accidental causes may be assigned. The mental defect is immediately shown following recovery from the disease. Of all the diseases and accidental conditions thought to contribute to feeble-mindedness, meningitis is probably the surest and the most frequent.

Blindness frequently occurs in families showing hereditary brain defect. Deafness may be a hereditary defect in some. Blindness and deafness are often purely accidental, and then prevent brain development solely by depriving the child of sensory experience. Special educational efforts may prevent this.

Consanguinity, or blood relationship, of parents has nothing to do of itself in causing feeble-mindedness. Where two hereditary feeble-minded persons, whether related or not, beget children, they will all be feeble-minded; and normal persons with no inherited feeble-mindedness in their families, whether related or not, will, barring accident, beget normal children. Normal persons, whether related or not, having an inheritance of a feeble-minded family trait, are likely to have some feeble-minded descendants.

THE TRAINING

The higher grades of mental defect are not incompatible with a good memory, and this often enables a moron to learn to do things that he does not understand. The feeble-minded lack the capacity to use the things they have learned, in meeting new situations. They lack judgment, and are incapable of abstract thinking to any important degree. They are unable to give close or prolonged attention, and are not persistent nor ambitious. Sense of responsibility, and ability to appreciate right and wrong, are as deficient as in children of the same mental age.

Mentally defective children, almost wholly incapable of abstract thinking, find it uninteresting, difficult, or impossible to study reading, writing, and numbers. Training in the concrete is therefore adapted to their needs—training to do things, which will add to their happiness and usefulness, and training in the simplest habits of conduct.

Idiots and low grade imbeciles can be trained to use a spoon or a fork, to eat in an orderly fashion, to control the bowel and the bladder, and such other things as one would expect a normal baby having the same mental age to be able to learn. Such training requires infinite patience and persistence, and “consists in putting together the two things that must be associated by the

child in a simple way, and separated from other factors, so that he can by no possibility escape making the desired association."

For the higher grade defectives, more and more association may be made by repetition until no error is possible—until the child associates the things we wish associated. Graduated physical training in all forms is helpful in developing nerve and muscle coördination. Games and music in this connection give pleasure and an incentive to keep up the work.

A step farther leads to learning to do useful things. This must be reached by gradations, care being taken that the child is not discouraged by being asked to do something that is beyond his feeble mind, for the defective child cannot see a goal that is afar off. He must be led carefully from simple to complex tasks, as fast and as far only as his capacity will permit. This applies to training in muscular control, recognition of colors and form, and all kinds of sense training, and manual training, or occupational work.

Efforts at training a child to speak should be begun as soon as backwardness is noticeable, before bad habits of speech or of not speaking are formed.

Making defective children happy, providing suitable play, and giving sufficient variation in their program are the essential points in their successful training.

SEXUAL PROBLEMS

Not because the sex instinct is unduly strong, but because judgment and the power of control are lacking, sexual irregularities occur among the feeble-minded. Masturbation is practically unpreventable. Higher grade defectives among the girls can imitate all the vanities of their normal sisters, and attract the attentions of indiscriminating and immoral men, and be led into all sorts of difficulties, becoming mothers of illegitimate children, passing on the defective trait, spreading venereal infection, *et cetera*.

Isolation in institutions for the feeble-minded, of these higher grade defectives, these moron girls, when once they show a lack of sufficient home training and discipline and supervision to keep them from a tendency to delinquency, is most essential.

Defective girls frequently marry normal men; defective men seldom marry any but defective women. Defective men who show sexual irregularities require isolation in institutions.

WHAT TO DO IN A CASE OF FEEBLE-MINDEDNESS

The foregoing paragraphs have been intended to give the essential principles relating to the nature of feeble-mindedness,

its causes, and its management. No attempt has been made to refer to all the questions that are being studied in connection with these children, nor to cover thoroughly the subjects mentioned. We hope that such facts as are given may help some anxious parent or friend of a backward child or of a very foolish person, to understand better that individual's conduct.

In caring for a young child with arrested mental development, favor him with as hygienic a regimen as possible. In training him, use such methods as would be suitable for a normal child of the same mental age. A visit to your state institution to see what they have learned to do there for such a child will repay you.

Whenever family finances, ill health, or excess of other family duties renders it impracticable to keep such a helpless and needy child at home, or it is unfair to the normal children of the family, consult your family physician, or your probate judge, or whatever officer may be authorized to look after such persons, in regard to committing the child to a state institution. Where private institutional care is contemplated, make inquiry for a thoroughly reliable place.

Unless you are exceptionally equipped and especially qualified for training and supervising such a child at home, and are located away from a crowded community, commitment to an institution becomes desirable, advantageous, and often a necessity after he becomes eight or nine years old.

Practically all feeble-minded with a mental age below nine years ought to receive institutional protection and restraint, for theirs and the public's good. Girls especially, of such a mental level, should be isolated from the time they approach puberty until they settle down to the practice of useful habits and submission to close supervision.

Every feeble-minded person showing criminal and immoral tendencies should be isolated, preferably in an institution equipped for directing properly such a one into helpful and useful activities.

When crime has been committed by a feeble-minded person, it is a proper contribution to justice to show his comparative lack of capacity for understanding right and wrong, and his innate lack of self-control and of responsibility. Justice recognizes the irresponsibility of one of tender years, but is slow to recognize the same in an adult of a child's mentality. When feeble-mindedness is an excuse for crime, it is also a reason for confining the patient for care and training, in order to protect society and to direct the patient's activities along better lines.

Insanity

Mental disturbance is so common that few large families escape the necessity of dealing with it. Anyone who takes an active part in community life is likely to meet it in neighbors, friends, or fellow workers. Insanity appears in so many forms that no one has been able to define it satisfactorily. For legal purposes, it may be considered as a prolonged departure, on account of brain disease, from a person's usual manner of feeling, thinking, and acting, to the extent that he is no longer responsible for his actions. Or, since feelings and thought can be judged by words and actions, we may say that insanity is a manifestation, in language or conduct, of brain disease.

It is evident, from this definition, that the impaired control over thinking and acting, seen in those suffering from nervous exhaustion — neurasthenics and psychasthenics — those who have difficulty in ridding themselves of troublesome doubts and fancies, does not constitute insanity. Neither is the fact that all of us at one time or another entertain certain bizarre ideas and show traits in the miniature that are manifested by the truly unbalanced, any warrant for the conclusion that everyone is a bit crazy.

In deciding whether a person is insane or not, there are many things to consider. The language and the conduct must be compared with a person's customary modes of expression and manner of reaction, and with those of his usual associates under similar influences and conditions. One must consider whether the apparently unusual conduct may not really be the result of an adequate cause. One's age, sex, education, conjugal relations, and religion are all factors determining the manner of life and the kind of actions that may be expected. The effect of admonitions, threats, and punishments upon conduct, the tendency to violence, and the reaction to restraint, the time, the place, the occasion, or even the duration of the unusual language and actions, must enter into the judgment of the case. What may be regarded as evidence of insanity in an ordinary adult may not be such in a child, in a defective with a childish understanding, nor in some college student out with his fellows to celebrate a football victory.

CAUSES

The association of symptoms of physical disease, of disturbed secretions, of nutritional and circulatory disturbances, with at-

tacks of insanity, emphasizes the important relation that the condition of the body in general, and of the brain in particular, bears to mental disease. The prevalence of insanity in the relatives of the insane, a distinct family tendency toward disturbed brain action, and the frequent occurrence of nervousness and instability in such families, indicate that hereditary predisposition contributes its influence to the causation of mental unbalance. Herein lies the reason for the appearance of insanity in one and not in another when both have been subject to an emotional shock of the same severity, or when both have suffered a similar brain injury. Defective heredity can be traced in seventy to eighty per cent of all cases.

One cannot be sure that bad example and unhealthful training have not affected in an unfavorable way the feelings, thoughts, and habits of the child, and thus predisposed the offspring of unstable parents to similar instability. Signs of physical degeneracy are also common among the victims of mind disease. Alcoholism, syphilis, and tuberculosis in past generations have been blamed for predisposing certain ones to unsoundness of mind.

We have come to believe that what we have been and what we are have much to do with our mental health. The way we settle the conflicts between the instinct of self-preservation, our selfish interests, and the tendencies of the flesh, on the one hand, and the social instinct, the love of social esteem, and our spiritual aims, on the other, influences the mental equilibrium very positively. Every physical experience that has occurred in the effort to exist must have some influence in determining whether or not the brain is predisposed to failure in the presence of a physical or mental crisis.

Proper early training, education, and the habits of thinking developed thereby, help to determine how well the brain will succeed in adapting the individual to the environment. Whether or not the person will become insane under the combined influence of an unfavorable physical condition and unusual mental strain or shock, is not always determined by the presence or absence of transmitted physical weakness, but sometimes by the early associations, by the character of the individual, and by the social life. In nearly every case of insanity, one of the factors is the conduct of one or more members of the family, or of some associates.

Still another factor in the production of insanity is the manner in which the character has been developed. The young person feels certain instincts and cravings which cry out for satisfaction but which are forbidden by the usages of society and

the demands of religion, cravings for which there are but few lawful satisfactions. A wrong move in the adjustment of these cravings may mean a moral fall, perhaps a mental unbalance.

Among the influences which may help the young person to make satisfactory adjustments, which neither compromise his morals nor cause a mental break, are (1) a careful training from childhood in self-denial, in living for principle rather than pleasure, emphasized by a consistent example on the part of the parents; (2) a genuine Christian experience; and (3) the choice of proper associates and elevating recreations.

These will do much to fortify him in dealing with instinctive cravings so that these will not be the paramount thing in his life, and may be adjusted without mental or moral loss. It should ever be realized that while these cravings are instinctive and to a certain extent inevitable, they may be greatly increased by the young person's attitude toward them, by evil associates, by a wrong course of reading, suggestive drama, or the use of stimulants and of rich and irritating foods. Intelligent parents who have a regard for their children's future will guard these points.

The young person going from the protective influence of his home into the larger field of society and the world, should go out so well fortified by loyalty to principle and by well established habits, that he will not be borne down in the swirl of temptation.

It is when an individual is conscious of cravings that cannot be satisfied, or depressed by forbidding social standards, that he feels a sense of inferiority, and becomes bashful, timid, retired, and may seek society having standards to which he can conform. Thus in place of seeking the society of those who would be a help to him, he finds those who encourage his tendency to yield to his cravings; or if he does not seek such society, he yields himself up to a dream life, in which he satisfies his cravings in imagination, and thus lays the foundation for disorders of the personality. On the other hand, yielding to his cravings may lead to transgression of the law, and may be followed, perhaps, by loss of self-esteem, the introduction of a sense of guilt, and the development of a remorse which may have an effect on the stability of the mind. Again, a venereal infection may be the result, and this may terminate fatally in paresis or softening of the brain.

There are other conflicts which may help to unbalance the mind, such as the struggle between sex cravings and the fear of the results of indulgence, between the desire for love and companionship and the fear of childbirth, between the hunger for a home of one's own and a sense of duty to dependent parents,

between the longing for offspring and the realization that the approaching menopause or the results of some operation will prevent childbearing.

Again there are conflicts that arise over a man's inability to provide for his family as he feels that he should, or when one with high ideals as to what his children's conduct should be realizes that they are far from meeting his standards.

In saying, "A merry heart doeth good like a medicine," the wise man expressed his appreciation of the fact that a contented mind, a cheerful spirit, is health to the body and strength to the soul. Unsettled conflicts that result in grief, anxiety, discontent, remorse, guilt, and distrust, tend to break down life's forces and to disturb the mental equilibrium. Love, sympathy, faith, hope, and courage promote health and stabilize the mind.

To maintain mental health, a man must know himself and settle his conflicts. A sufficient endowment of intelligence, correct early training, and education may enable him to acquire enough of the principles of truth to keep him sane without his giving recognition to God. Some men's philosophy of life may enable them to forget past mistakes, and to press on toward more perfect human relations, and to live decent, useful, and healthful lives; but for most of us, the maintenance of peace of mind and mental health, the training and development of well balanced offspring, means the grasping of the Christian principles of forgiveness of sin, salvation by faith, and the doctrine of divine grace. In many cases of hereditary instability, or ill health, with consequent morbid conscientiousness, or of unsettled moral questions, or in cases where there have been actual offenses against one's fellow men, the gospel offers the only effectual remedy.

The foregoing considerations reveal the importance of good parentage, proper nutrition, a thorough education, a hygienic, temperate, decent, useful life, and an understanding and practice of true religion, for the maintenance of a sound mind.

THE CARE OF THE INSANE

Institutional care is desirable for all forms of insanity. However, where prolonged observation makes an experienced caretaker familiar with the tendencies of a demented person, and causes him to regard the patient as safe and inoffensive, there seems no good reason why a responsible family, able to maintain a special environment and private supervision for such a member, should not be permitted to do so.

The person developing a psychosis is fortunate to have a close relative or friend who notices the early signs and symptoms, and appreciates their significance, and willingly assumes responsi-

bility for deciding upon the steps necessary to secure early and adequate care. Failure to do this, often means that a minor trouble may drift into a serious mental illness. Some one having the moral right to assume control over a victim of disease which renders him irresponsible should do so long before his disturbed conduct calls for intervention by legal measures on the part of strangers. Close family ties, long friendship, or established professional relations are reasons enough for asserting this right where the need is obvious to ordinarily intelligent persons.

Proper care means safety for the patient and for the public; it means the placing of an irresponsible victim of a mental disease under efficient, kind, and understanding supervision; it includes thorough medical care for his physical needs, and attention to his disordered thinking.

Delirious, confused, or stuporous patients must have their activities restricted to a room practically emptied of small pieces of furniture, breakable articles, and every unnecessary thing that might be misused or contribute to the injury of either the patient or his attendant. A first floor room is safer and to be preferred. Windows may be fastened down by a small block and screw placed so as to check the lower sash when it is raised three to six inches. Large windows may be protected temporarily by placing heavy pieces of furniture before them so as to render them difficult of access. Open fireplaces and stoves and firing utensils are dangerous in the room of such a patient. Depressed patients are all tempted to self-injury, and should be protected by avoidance of open windows, great heights, open fireplaces, railroad tracks, automobiles, and bodies of water. Poisons, fire-arms, sharp or pointed objects, matches, ropes, *et cetera*, must not be allowed to lie around in accessible places. Cisterns and open wells must be rendered difficult to get at. Patients definitely struggling with the suicidal impulse, or who have once made an attempt at suicide, must not be left alone until placed in charge of a competent medical man, and then the physician or the authorities must be told of the patient's tendencies.

Whenever a patient shows excessive muscular activity or violent tendencies, more than one calm, strong, resourceful person should undertake to control him. The patient fares better where there is no doubt that a superior force is undertaking to manage him. When he has been placed upon a strong bed, his wrists and ankles may be fastened toward the four corners of the bed by means of sheets folded lengthwise and put around the limbs in the form of a loop or hitch knot and tied to the sides or corners of the bed. When once physical control is attained, let every unnecessary person get out of the room, and let one or two calmly

deal with the patient as a sick person. He must not be kept tied in one position many hours, and bruising must be avoided.

Where the financial status of the patient or of his interested friends will permit, he may have private institutional care during a period of observation and treatment. In a few cities, special wards or hospitals are maintained for this purpose, under the name of detention wards, or psychopathic wards and hospitals. In most instances, the insanity is indisputable, and the patient, without court proceedings, can be kept under observation and treatment for from six weeks to six months.

Private institutional treatment where patients are treated, nursed, and cared for in large groups, is usually no better than public institutional treatment, and often is not so good. The better private institutions maintain a more individualized service, and are able to render a service more in harmony with the patient's needs and customary manner of living.

State hospital care is not without its advantages. Most states and many counties have institutions for the care and treatment of the insane, which are usually under the supervision of highly honorable medical men, who strive to obtain for their patients kindness and comfort and efficient treatment. While sensitive patients may suffer from lack of individualized treatment and from apparent lack of attention, those who are annoyed by close attention and nursing seem happier under treatment carried out on the group plan in large rooms or long halls and in the midst of the more extensive associations of a state hospital for the insane. Defiant and combative patients seem to yield better to the discipline of state authority, massive buildings, and other features of such hospitals. The mere custodial care of terminal demented and chronically insane is provided more economically in state institutions than in ordinary private institutions, and for the most part, quite as well.

Persons becoming mentally nervous, or showing signs of a developing insanity, or the actually insane, are benefited by a change from their usual environment, and do better among those who do not emphasize the painful unsettled conflict, and who can and will safeguard the patient against neglect of physical needs, and injury to himself or others, and prevent damage to property. The rule is that an insane patient will do better and be more safely cared for among strangers than at home, and especially if sent to an institution conducted for the special care of this class.

Relatives usually make poor nurses for these patients, being more likely to aggravate the mental disturbance, to overlook the dangers of suicide, and to provoke attacks. Relatives and

friends should seek the advice of the attending physician as to visiting or writing to such patients. Competent physicians will understand the necessity of encouraging a patient's confidence in his family and friends, will forbid harmful visiting, and will recognize the psychological moment for family visits. They will even acknowledge the right of anxious and mistrusting friends to see for themselves that their loved one is neither abused nor neglected. Sentimental and erratic relatives are a hindrance to the treatment of a patient. Visiting privileges must be denied such people, even if the physician must give up his responsibility in the case as a consequence.

Commitment to a state hospital may be obtained for an insane patient by having the judge of the probate court or some similar local court pass on the mental state of the individual. An affidavit charging lunacy is filed with the clerk of the court, and the patient is taken in charge by the sheriff, or placed in a detention hospital, or left in charge of competent friends. The court has one or more physicians examine the alleged lunatic, and listens to their testimony and that of lay witnesses. If the person is adjudged insane, the court has the physicians make out a medical certificate with reference to the patient, and sends a copy of this with his findings, and requests admission for the patient to the state hospital.

Section X—The Respiratory System

CHAPTER 42

Physiology of Respiration

Living things are always in activity, and exhibit the phenomena of growth, reproduction, and movement. These manifestations of life require the production of energy. Energy is not created, but is derived from the medium in which the object lives. For this purpose, the cell utilizes the nourishment it has accumulated. With oxygen, however, rests the work of so altering the complex organic substances built into the cell as to liberate the pent-up energy for running the human machine. Without it, there could be no energy output.

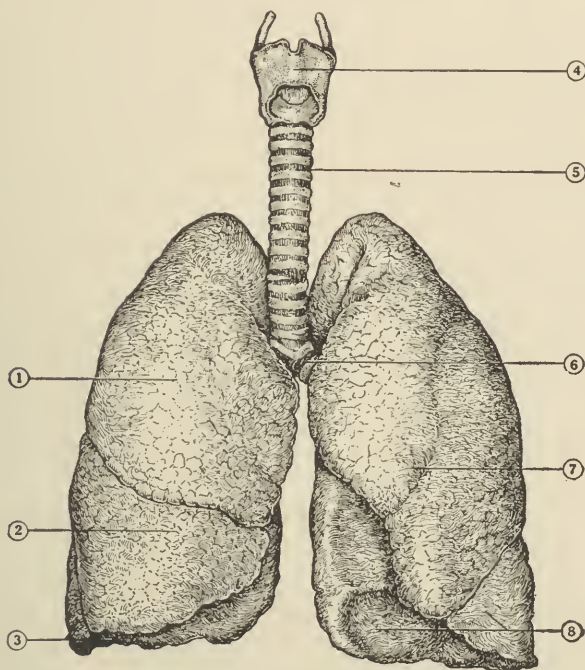
The use of oxygen always gives rise, also, to the production of carbon dioxide. Thus two gases—oxygen and carbon dioxide—are intimately concerned in all vital processes; and provision has been made by the Creator for the interchange of these between the individual cell and the atmospheric air. Oxygen for the cell must be obtained from the air, and carbon dioxide from the cell must go to the air. The term that has been applied to this mechanism is “respiration,” or “breathing”; the organs designed to functionate thus are the lungs.

THE THORACIC CAVITY

The lungs are located in an air-tight cavity known as the thorax, or commonly, the chest. This cavity has a bony framework of ribs, arched in such a way that when it is elevated by the contraction of a most unique system of muscles, the cavity is enlarged in two diameters,—crosswise and front to back. The chest cavity is separated from the abdomen by a strong sheet of muscle, the diaphragm. This muscular partition is arched above the stomach and the liver, and presents the appearance of a dome. When it contracts, the center of the dome is lowered, the liver and the stomach are pushed down a bit, and the vertical diameter of the chest cavity is increased. This action of the diaphragm occurs simultaneously with the elevation of the ribs, all controlled by the nervous system. Thus all diameters of the chest cavity are enlarged at once.

THE LUNGS

Closely approximating the chest wall at all points are the lungs. They are constituted of several hundred millions of tiny air sacs, each less than one two-hundredth of an inch in diameter. The windpipe divides into two large branches, the right and left bronchi, which in turn split into innumerable divisions, the smaller of which are distributed to groups of these tiny sacs.



LUNGS AND TRACHEA AS SEEN FROM THE FRONT

- | | |
|-----------------------------|--------------------------------|
| 1. Right lung, upper lobe | 5. Trachea, or windpipe |
| 2. Middle lobe | 6. Left bronchus entering lung |
| 3. Lower lobe | 7. Left lung, upper lobe |
| 4. Cartilages of the larynx | 8. Lower lobe |

The windpipe is about one inch in diameter — large enough to accommodate a fair-sized object that might accidentally go its way. Objects that enter the trachea may readily find their way into the right bronchus; for it is nearer to the vertical than the left bronchus, and is nearly as wide as the windpipe.

The air sacs are made up of the finest of elastic membrane, outside of which, thin-walled blood vessels ramify in every

direction. The elasticity of the lung is so great that its natural inclination is to bunch in a tight wad around the bronchi; but the weight of the atmospheric air — fifteen pounds to the square inch — having free access to the lungs through the windpipe, forces it out and holds it firmly against the wall of the chest cavity. Of course, then, when the chest enlarges, the lung continues to follow the chest wall, the atmospheric pressure simply forcing the lung tissue to greater expansion by the entrance of more air. When we inhale, therefore, we are merely increasing the capacity of the lung cavity so that the forces of nature can operate to furnish us with a fresh supply. When we exhale, we mechanically decrease the size of the cavity, and air is forced out of our lungs.

Suppose we cut a round hole in a cork and fit into it a piece of glass tubing, to one end of which a small rubber balloon is made fast. Let us now fit this cork into a bottle in such a way that the balloon is on the inside. We will say that the bottle is air-tight. If it were possible to abstract from the bottle the air outside of the balloon, the pressure of the atmospheric air would cause the balloon to fill the space formerly occupied by the air. The balloon would be filled by atmospheric air, and the rubber membrane would line the inner wall of the bottle. Now, if we could increase or decrease the size of the bottle, the volume of air in the balloon would be proportionately altered. This may illustrate in a crude way the principle involved in the mechanism of the ventilation of the lungs.

THE TRANSFER OF OXYGEN AND CARBON DIOXIDE

Gas is passed from one place to another by diffusion. If we put five pounds of oxygen on one side of a membrane, and call it A, and two pounds on the other side, and call it B, there will be a passage of gas from A to B until the pressure on each side is equal. The same is true of carbon dioxide or any other gas. Each gas diffuses from a point of high to a point of lower pressure.

Thus when there enters the lungs, on inspiration, or inhaling, atmospheric air containing oxygen with a pressure in the air sac of 109 millimeters of mercury, it will pass through the thin membrane of the air sac, the blood vessel wall, and into the blood; for in the blood, the oxygen pressure is only 37 millimeters of mercury. Then, again, the pressure of carbon dioxide in the blood is 46 millimeters of mercury, while that of the inspired air in the air sac is only 40 millimeters of mercury. Obviously, some of the carbon dioxide will pass from the blood out through the membranes and into the air of the air sac, to be thrown off

on expiration, or exhaling. In a similar way, the gases are transferred between the blood and the tissue cells as the blood penetrates the capillary areas.

These gases are carried in the blood in a very interesting manner. The red blood cell contains a reddish-brown iron compound called hæmoglobin, and oxygen enters into a loose chemical combination with this substance. The oxygen-carrying power of the blood, then, is dependent upon two things: first, the number of red blood cells; and second, the amount of hæmoglobin in each cell.

It is interesting to note, in this connection, that the numerous medicinal agencies containing iron are of little value in the building up of either the red blood cell or the hæmoglobin in that cell. Careful scientific investigation has shown that the natural physiological agencies—that is, diet, sunshine, fresh air, and hydrotherapy—are the most efficient blood regenerators.

Most of the carbon dioxide is carried in chemical combination with the alkalies of the blood, some of it in solution in the blood, and some of it in the red blood cell. Inasmuch as most of this waste product of cellular activity is carried by the alkalies of the blood, any diseased condition that would tend to deplete the body of this alkali would render increasingly difficult the throwing off of the carbon dioxide. This would then gradually accumulate in the tissues, for the blood could not carry it to the lungs for exhalation. Eventually the person would die of asphyxia.

The greater the expenditure of energy, as in physical labor or exercise, the greater the need of oxygen, and the greater the production of carbon dioxide. We consequently find it necessary to increase the rate and depth of our respiratory efforts. When there is any interference with the proper circulation of the blood, we seem to experience great difficulty in getting enough air. This is because the blood is not moving fast enough to supply sufficient oxygen to the tissues or to remove the carbon dioxide properly. We become oxygen hungry, and may, perhaps, suffer a degree of suffocation.

THE CONTROL OF RESPIRATION

There is a very sensitive group of nerve cells in a certain locality in the brain, that is very responsive to any increase in the carbon dioxide in which it is bathed. It is known as the respiratory center, and it exercises a controlling influence over the breathing activities. When the carbon dioxide content of the blood goes up, this center causes the respiratory rate and depth to be increased, in an effort to throw off the excess of waste gas. Again, when the carbon dioxide content is decreased,

breathing is slowed down. Thus the nervous system is able to keep a check on body activities and to regulate the gaseous interchange to meet its needs.

PROTECTIVE AGENCIES

In the windpipe, the bronchi, and their larger radials, we have a lining membrane containing minute hairlike processes known as cilia, that protrude out into the air passages. They have a wavelike motion, which might be likened to the appearance of a grainfield swept by the breeze. The function of these cilia is to sweep offending foreign particles snared by mucus out toward the throat, where they may induce a spell of coughing, and thus be effectively removed from the air passages.

If we are brought in contact with irritating gases, a so-called protective reflex is immediately introduced. The trapdoor (the epiglottis) at the beginning of the trachea claps shut, and the musculature of the tiniest air passages constricts. Irritation of nerve fibers in the nose and throat by the gas will cause a message to be sent to the respiratory center, bringing about an immediate cessation of respiration. Thus the delicate lining membrane of the lung is effectively protected for the time.

Sneezing is another reflex introduced as a result of a tickling in the air passage of the nose by foreign particles. The spasmodic effort is usually effective in dislodging the offending particles.

Diseases of Lungs and Pleura

Pneumonia is an inflammation of the lung. Pleurisy is an inflammation of the membrane (the pleura) lining the chest and covering the lung. Empyema is an inflammation of the pleura, with the formation of pus (an abscess) in the pleural sac.

PNEUMONIA

Pneumonia is one of the most important causes of death, and for a number of years, in the United States, caused more deaths than any other disease. In the "registration area" of the United States, in 1919, pneumonia, including all forms, caused 105,213 deaths. In the same year, tuberculosis, including all forms, caused 106,985 deaths. At the same time, organic diseases of the heart caused 111,579 deaths. For that year, however, the census report states that the death rate from pneumonia was less than it had been for many years.

Causes: Exposure to cold and dampness are important factors in its causation. It is a disease of the seasons of greatest cold and greatest weather changes, namely, winter and spring. It prevails about equally in hot and cold countries. It predominates in cities and overcrowded, unhygienic, and insanitary surroundings. Alcoholism predisposes to pneumonia. Statistics seem to show that the disease is on the increase. At times, it assumes epidemic proportions.

There are two forms of pneumonia,—lobar and broncho-pneumonia. In lobar pneumonia, the disease involves one or more entire divisions or lobes of the lung; for example, the middle and lower right lobes or the lower left lobe, these being the most commonly involved. In broncho-pneumonia, the lung tissue is inflamed immediately about the bronchial tubes, and involves both lungs more or less. Either form may come on as an independent or primary disease, or may complicate some other disease, such as typhoid fever, measles, or influenza. In the latter cases, it is called a secondary or complicating disease, and in the nature of things, is more serious than when primary.

Lung Fever, or Croupous Pneumonia (*Lobar Pneumonia*). Pneumonia is an acute infectious disease, beginning with a severe lung congestion. This first stage lasts but a few hours at most, and it is followed by consolidation of the lung tissue, in which the air sacs are filled with red blood cells and fibrin. In this stage, the lung becomes solid, like liver. In the third and last

stage, this consolidation begins to soften, and air again enters the small bronchial tubes and the air sacs. The duration of the disease is usually from five to twelve days.

Symptoms: No other acute disease is so easily recognized by patient or friends. The onset is generally sudden, with severe pain in the side, and a definite chill, lasting fifteen to thirty minutes. The breathing is difficult and rapid. The fever quickly reaches 103° or 104° F. In a day or two, the face is flushed, especially one or both cheeks; there are often fever sores on the lips; and in a little time, a short, painful cough develops, followed by the raising of a thick, blood-tinged sputum. There is but little difference between morning and evening temperature, the fever remaining high until the crisis, when, in the course of twenty-four hours, it may drop as much as six or even ten degrees. It is not at all uncommon, at the crisis, for the fever to drop from 104° down to 96° or lower in less than twenty-four hours. The crisis is often accompanied by sweating, and the patient sinks into a comfortable sleep. The serious stage of the disease is now past.

The course of the disease and the symptoms may vary somewhat. Sometimes the chill is absent or slight and the fever rises more slowly. The fever may end by gradual lowering in the course of three or four days instead of a sudden drop. This frequently occurs when pneumonia is secondary to some other disease.

Prevention: Pneumonia might often be prevented if colds, coughs, chilling, and exposure to cold and dampness were promptly treated. Under such conditions, it is well to take a vigorous sweat, with proper cooling off afterwards, and remain indoors for a number of hours or overnight. A sweat may be secured in any one of several ways. A hot tub-bath is perhaps the easiest means. At the close, the patient should sit up in the tub and rub off the upper part of the body with cold water, and follow with the same to other parts as he stands in the tub and on stepping out. This rubbing off with cold water, one part at a time, lessens the liability to take cold afterwards. If there is much chilliness or a cough, the help of another member of the family should be enlisted, and a sweat taken in bed and in a warm room, by means of a hot foot bath, fomentations to the chest, and some hot drink, such as hot lemonade. These three should be given all at the same time, and continued until profuse perspiration is produced. The treatment should then be finished by a cold mitten friction. (See chapter 10.)

In event of the onset of an acute illness with chilling, severe pain in the side, rapid and difficult breathing, and a high tem-

perature, it is safe to conclude that pneumonia is present, and a competent physician should be summoned. Other diseases which may appear like pneumonia at the beginning are pleurisy and empyema. In pleurisy, the pain is of the same sort, but the onset is usually less rapid, the chill is absent or less severe, the temperature is ordinarily not so high, and the patient does not seem so ill. In fact, all the symptoms are less in severity.

Empyema may have an onset like pneumonia and pleurisy, but it is more frequently a complication than a primary disease.

Treatment: Having decided or suspected that pneumonia is present, or that it is just beginning, call a physician; but there are a number of things that can be begun and accomplished even before the physician may arrive, and that will be entirely in order.

There are probably no conditions that might be mistaken for pneumonia in which a cathartic would be injurious; therefore begin the treatment with a brisk cathartic as directed in chapter 12. It is generally best not to wait for this to act, but to give a thorough enema (see chapter 10) at once, and then proceed with other treatment, as gaining a little time may mean much to the patient. Put him to bed in a warm room with plenty of bedding.

With the patient lying in bed, give a hot foot bath, and fomentations over the part of the chest where the pain is located, keeping him well covered, and adding hot water to the foot bath as fast as it can be borne. (See chapter 10.) The fomentations must be very thick and very large, so as to cover one entire side of the chest, from the spine to the breastbone. From four to six fomentations must be given, or enough to produce abundant sweating. If he does not sweat well, give hot lemonade or other hot drink.

When profuse sweating is secured, and the feet and the skin of the chest are thoroughly red, it is time to conclude the treatment with a cold mitten friction. (See chapter 10.) During this part of the treatment, see that the body is well covered, except the portion under treatment. The feet are kept in the hot bath till the time of giving the friction to the back and the hips. After the friction is completed, all wet or damp bedding is replaced by dry, and dry sleeping garments warmed at the stove should be put on.

These points are all mentioned in detail, since each one is of the utmost importance.

The room must be unusually warm during the treatment. The patient must be in bed and warmly covered. All applications must be very hot. Fomentations must be very large and thick. Changes must be made either under cover or quickly without exposure. The cold mitten friction must be energetically

and very briskly given, only one part of the body being exposed at a time, and the hot applications being removed only as that part of the body is reached.

It will be readily seen that such a treatment relieves the lung congestion, by drawing a great amount of blood to the feet and to the surface of the body, and that the cold friction leaves the circulation active and in a tonic condition, and removes the tendency to chilling and taking cold so common after sweating baths. If the pneumonia has thus far been only a severe lung congestion, and the second stage of lung consolidation is not fully fixed, the disease may be stopped and the patient may recover in three or four days. If the second stage of pneumonia has already been reached, its advance to other lobes may be prevented by such treatment.

Garments for Pneumonia Patients. A two-piece outing flannel pajama suit is best for pneumonia patients. It is closely applied to the body, and hence much warmer than the ordinary nightgown or nightshirt. It is easily removed for treatments. In many cases, and particularly in winter, warm bed socks should be worn. Of course, hot water bottles are used as needed. The electric warming pad is better and more effective than hot water bottles, especially where dry heat is to be applied to the chest. With children, and perhaps also with many adults, it is well to use a dry pneumonia jacket. This prevents any exposure about the neck and the shoulders. If there is much perspiring, the skin should be dried and the garments changed frequently. After treatment, the room temperature may be lowered to 68° F.; but plenty of fresh air must be constantly supplied, and care should be taken that the patient is not in a draft.

Do not allow the patient out of bed for any purpose. Bedpans and urinals should be used. Keep a piteher of cold water, a glass, and a drinking tube at the bedside, encouraging the patient to drink about a half glass or more of water every forty-five to sixty minutes when awake. Sunshine should be freely admitted to the room.

After the first treatment, the patient should rest for several hours, and sleep if possible. The daily program of treatment should consist of one full treatment for the forenoon, such as a hot foot bath or other hot application to the feet and the legs, and fomentations (three only) to such part of the chest as will cover the lung involved. No special attempt should now be made to cause perspiration, and hot applications and treatments should be of brief duration. Fomentations should be very hot but not prolonged. Each full treatment should be concluded with a cold mitten friction. If the patient is very ill, the same treatment

may be repeated in the late afternoon. If he is not so ill, a very brief treatment may be given in the late afternoon or the early evening. This may consist of three fomentations to the upper chest in front in ease of troublesome cough, or to the spine in case of restlessness and difficulty in sleeping. A warm sponge or an alcohol or witch-hazel rub may be given if desired. Time for rest and sleep is just as essential as treatment, and good judgment should be exercised in this regard.

In case of rapid, weak heart action, the ice bag may be applied over the heart itself for twenty to thirty minutes at a time, and reapplied as needed. (See chapter 10.) Thick cold compresses, which remain cold for a long time, should not be used over the lungs except in some cases where the temperature is very high, in which case they may be renewed every thirty or forty minutes—that is, after they have warmed up. If such cold compresses are used, a set of three fomentations should replace them every three hours. It would be best not to use cold compresses except under the direction of a physician. Long continued cold compresses are harmful in broncho-pneumonia and in the pneumonia of influenza.

Cough may be relieved by fomentations to the upper chest or over a painful area. Inhalations of medicated steam are often very helpful. (See under "Whooping Cough," chapter 45.) Delirium will not be prolonged or serious where treatment is begun early in the course of the disease. If it appears, urge more water, or the use of lemonade with soda—a half to one teaspoonful of baking soda to the glass of lemonade or orangeade. This may be given two or three times a day. Hot water may be better than cold if there is distress in the stomach. Ice bags and frequently changed cold compresses to the head will help in relieving delirium. All treatments should be brief but vigorous—that is, fomentations quite hot, and the cold friction brisk and energetic; or fomentations may be alternated with stimulating cold compresses. (See chapter 10.)

Bowels. See that the bowels move daily. Give cathartics every other day or every day if needed. Often it is best to use the enema on alternate days. No set rules can be given for this. Good judgment must be exercised according to the case. If there is accumulation of gas in the bowels, and distention of the abdomen, use the revulsive compress—alternate hot and cold applications—to the abdomen. Hot enemata of soapsuds aid in the relief of this distressing condition. There are several simple but effective medicines that may be used to expel gas, but these are best given by the physician's orders. One of these is an extract of the pituitary gland, given by hypodermic. It is nature's

stimulant to involuntary muscle, and acts upon the heart, the blood vessels, and the intestines; so it is a very valuable medicine in complications arising in grave infectious diseases.

For severe pleurisy pains in pneumonia, nothing is so beneficial as a set of very hot fomentations. The relief thus obtained may be prolonged by the use of the electric heating pad. See that the patient is not disturbed at night by cough, pain, or the giving of medicines not specially ordered for the night.

Approach of the Crisis. From the fifth day onward, the patient should be carefully watched for the appearance of symptoms of the crisis, as indicated by sweating, cold forehead, or a drop of more than two degrees in the temperature. As the fever goes down, and particularly as the temperature passes below normal, see that hot water bottles are supplied, and plenty of warm bedding; and if necessary, the room itself should be warmed up somewhat.

Warm drinks or hot soups may be given to advantage. At this time, the temperature should be taken at least every two hours. During the course of the disease, the pulse, the temperature, and the rate of breathing should be recorded about every three hours during the day, and two or more times at night, as may seem needed.

Diet. The patient should not eat solid food while the temperature is high— 103° or above. Under these conditions, it is best to use highly nutritious soups, such as *purée* of peas, rice, or barley, or cream soups of these. Malted milk is very useful. Several of the infant foods are quite satisfactory prepared in much the same way as malted milk. If thought best, food may be given five times a day at three-hour intervals. Egg-nogs made with cream or fruit juices are very nutritious. Fruit juices, especially orange juice, may be given several times a day. Prune whip and the soft pulp of other fruits make a pleasant and desirable variation with some of the meals. Gruels and soft poached eggs may be used if the digestion is in good condition and there is no accumulation of gas or abdominal distention.

Broncho-Pneumonia. This is oftener a secondary disease than a primary. It occurs as a complication of measles, influenza, whooping cough, scarlet fever, and diphtheria, and less frequently in other diseases. It is common as a primary disease in children under two years of age and in the aged. As a primary disease, it is less common in the intervening years. As a complicating disease, it often follows a severe bronchitis at any age.

Treatment: In broncho-pneumonia, a few important points should be kept in mind,—points in which the treatment differs

from that of lobar pneumonia. Since broncho-pneumonia is only the extension of a severe (capillary) bronchitis, the patient should *not* breathe cold air. The air of the sick room should be fresh and constantly changing, but it should be warm. Inhalations of medicated steam are very helpful in relieving cough and bronchial irritation, and the heat is a decided benefit in loosening the secretions, making expectoration much easier. In lobar pneumonia, fomentations are applied over the affected lung to the side of the chest, from spine to sternum. In broncho-pneumonia, the fomentations are given mostly over the front of the chest. However, do not neglect the back of the lung area, which should receive treatment at least once each twenty-four hours. In children, the revulsive compress is very beneficial, but the cold compress after each fomentation should be applied only for an instant, and immediately replaced with another fomentation. This makes the child take a deep breath, and so keeps open the finer bronchial tubes and air sacs as much as possible. (For the treatment of the pneumonia of influenza, see "Influenzal Pneumonia," in this chapter.)

Some physicians prefer the mustard foot bath and mustard fomentations in these cases. They produce good results; but the mustard may cause considerable skin irritation, and thus make it difficult to give further treatment. For this reason, the writer prefers the plain fomentation, even with young children and infants. Poultices are a lazy and inefficient means of applying heat, compared with a properly given fomentation. They are always left on too long — a half hour to several hours — while fomentations must be renewed about every eight or ten minutes. The different ingredients, such as onion and hops, have no virtue in themselves. The results, if any, are all due to the heat.

Cautions: Pneumonia is not cured by medicines of any kind. Only one type of pneumonia infection has so far been successfully treated by serums. The physician in attendance will look after this matter. Medicines have no specific curative effect. It would seem that the enormous increase in the number of the white cells in the blood which occurs in pneumonia is nature's special means of defense and recovery from pneumonia infection. Therefore it stands to reason that every agency should be used to assist the work of these white cells. This is done by hot and cold applications, cold frictions, *et cetera*, which stimulate these cells, and also increase their number, and their activity in destroying bacteria. Both alcohol and quinine greatly hinder the activity of the white blood cells, and cripple or destroy the body's natural defense against infection. They increase the danger of abscess and empyema complicating pneumonia.

Another matter is also of great importance, and might with benefit be understood even by the general public. Death in pneumonia is largely attributable to failure of the circulation. This, however, is not heart failure, but failure of the blood vessels to do their part in the work of the circulation. The blood vessels, and the nerves controlling their size and activity, are damaged by the poisons produced by the pneumonia germ. Hot and cold applications and cold friction increase the burning up of these poisons by about 50% to 150%, and so get rid of them almost as fast as they are formed. These treatments also directly stimulate the action of the blood vessels and hasten the circulation.

The giving of strychnine as a heart stimulant is always harmful: first because the heart is not seriously at fault, and second because this drug irritates the heart and exhausts the power of the nerves controlling the blood vessels. In other words, it has the same effect as the poisons generated by the pneumonia germs. In this connection, it is interesting to note that the best surgeons long ago discarded strychnine in treating emergencies arising in surgical practice.

PLEURISY

Pleurisy may be either dry or with effusion — that is, accompanied by the production of a watery fluid in the chest cavity. It may be caused by infection, as with the tubercle bacillus, the pneumococcus, or the streptococcus. The two latter are germs commonly present in pneumonia. The pleurisy may be a result of injury, as from a broken rib. Various estimates class from 30% to 60% of all pleurisies as tuberculous. Their nature is proved either by examination of the fluid or by the subsequent history of the patient in developing some more obvious form of tuberculosis — as of the lung. The membranes are swollen and inflamed, and at first rub together with each breath, causing pain, and a sound that can be heard through the stethoscope, or the rub may even be felt by placing the fingers on the chest.

The disease may remain dry throughout its course, or fluid may form, separating the surfaces, and thus relieving much or all of the pain. This fluid may be very small in amount, or may fill one entire cavity, amounting to several quarts, and compressing the lung. Some pleurisy is always present in lobar pneumonia. A pleurisy may be very limited in extent. If it were on the surface of the diaphragm, it might give no signs which the physician could detect, possibly for a number of days, until it has spread to the adjacent chest wall, where the rub can be heard. The pain in such case may be in the abdomen or at the pit of the stomach, and hence appear to be due to disease of the stomach, the liver, or the gall bladder.

In children, pleurisy pain and the pain of pneumonia are frequently located in the abdomen, and hence may lead to suspicion of acute indigestion or even appendicitis. The writer has had numerous cases where the pleurisy was located on the pleural membrane against the left side of the heart, making it appear that the pain was in the heart itself. The rub could be heard only along the left border of the heart, and sometimes only after two or three days from the onset. These facts will help anxious friends to await with patience the time when, in difficult cases, the physician can give a positive diagnosis. Do not lose confidence in your physician because he does not at once state the name and nature of your disease. Your confidence is better based upon his thoroughness and carefulness in repeated examinations.

Symptoms: These are very much like those of pneumonia (see under "Pneumonia," this chapter), but are not so severe. The disease may be very serious, or very mild and of short duration. Prompt treatment often quickly relieves it and cuts short its course. What might otherwise be a grave illness may be made a very slight one.

Treatment: This need not be as elaborate as for pneumonia. A hot foot bath lasting about fifteen minutes should be given. This may be done before the patient is put to bed or afterwards. Both the bedroom and the bedding should be warm. After the patient's feet have been well warmed, apply fomentations to the painful side. In doing this, it is best to have the patient lie on the opposite side, and apply the fomentations under the arm, covering the entire side of the chest, from breastbone to spine. These fomentations must be very large, very thick, and very hot, and should be changed before they cool sufficiently to become really comfortable. From three to five in succession may be needed to relieve the pain entirely. Unless close attention is paid to these details, the treatments will fail utterly. If the fomentations are not extremely hot, if they are allowed to remain on too long, or if the chest is exposed in changing the fomentations, the patient may even be worse after than before treatment.

Use no cold water on the chest after the last fomentation, as is usual in other conditions. Simply dry the skin thoroughly and cover with warm, dry garments. It may be best to use a hot water bottle to the chest after the treatment, for the first few hours.

The treatment may be repeated as often as necessary to relieve the pain—in an ordinary mild case, about three times in the first twenty-four hours. After that, if the pain has been largely relieved, once or twice a day will be enough. By this time, the skin may be cooled after the last fomentation of each treatment,

by a very brief and gentle rubbing with a cloth wrung from cold water; or possibly a cold mitten friction may be given to the rest of the body, avoiding the painful side of the chest.

No jarring or rough treatment should be used, as vibration of the inflamed membranes makes the pleurisy worse. A ride on a street car or in an automobile is very likely to cause trouble. In cases of dry pleurisy and in those with a very little water in the chest, the treatment here indicated is sufficient. In any but light cases, yielding readily to simple treatment, a physician



A Patient in Position for Fomentations to the Chest in Pleurisy

should be in daily attendance. If much fluid accumulates, he will probably remove it by tapping. Two or three quarts may have to be removed at a time; and often tapping must be repeated a few days later, or in persistent cases, several times. Treatment by fomentations, or the revulsive compress (see chapter 10), should be used once or twice a day, even when tapping is necessary. The treatment aids in the absorption of the fluid.

Physicians often give large doses of a saline cathartic, or moderate doses frequently repeated, to aid in getting rid of the fluid. A saline cathartic produces a watery bowel movement, and this removal of fluid from the body helps the circulation to absorb water from the chest. Such treatment is beneficial if it does not weaken the patient. In long continued cases, the circulation should be stimulated by daily treatment with a hot foot bath, fomentations or the revulsive compress to the chest, and a cold mitten friction. The food should be very nutritious, but the water and other liquids must be given in only limited quantity. Sunshine and fresh air are also very important, and often especially so, as many of the protracted cases are tuberculous.

Strapping of the chest with adhesive plaster is often resorted to in the early stages, to relieve the acute pain. The result is nowhere near as satisfactory as with the fomentation; and unlike the fomentation, it helps but little in reducing the inflammation. A pleurisy with fluid may accompany a tubercular pneumonia. When the fluid is pus, the disease is called *empyema*. This may be independent of any other disease, or may accompany a pneumonia, or follow it.

EMPHYEMA

Empyema is the formation of pus in the pleural cavity, that is, between the lung and the chest wall. It is always a serious disease, and requires daily attendance of the physician.

Symptoms: The symptoms are like those of pneumonia and pleurisy. However, after a few days, the patient shows indications of a very severe infection. The temperature is generally quite irregular, and there are drenching sweats. To determine whether the fluid present is water or pus requires tapping; and the syringe needle may have to be inserted in several places before pus is found, in case this is small in amount.

If pus is found, a large opening will have to be made, or a piece of a rib removed, in order to permit of thorough draining off of the pus. This drainage must continue for a long time, often for a number of weeks or even months. The partially collapsed lung must expand to fill the space occupied by the pus. To help this along, the patient may take regular lung exercise by blowing a wind instrument or by blowing water from one large bottle to another connected by rubber tubing.

Treatment: Empyema is a surgical disease, and as stated, must be operated. An abscess of the lung itself may look very much like an empyema; and in this case, repeated examinations will be necessary to distinguish between a disease demanding operation to drain the pus and one in which it would do no good. In case of an abscess of the lung, the pus is after a time usually coughed up. Both diseases are serious and may result fatally.

A few cases of severe and much protracted empyema, in which the lung does not fully expand, must undergo a more extensive operation. In these cases, several ribs may have to be removed to allow the chest wall to collapse against the lung that has persistently refused to expand. Of course, the surgeon will not recommend this until all other means have failed.

INFLUENZA, SPANISH INFLUENZA, GRIPPE, LA GRIPPE

This disease is characterized by sudden and severe onset. Its suddenness and severity are in inverse proportion to the length of time ensuing between exposure and the appearance of the

symptoms, and are more severe in persons living in crowded and unsanitary conditions.

These epidemics, or rather pandemics, have seemed to originate in Western Asia, and travel from east to west with the speed of the prevailing modes of travel. The one in 1918, because it appeared in its first great severity in Spain, has been called "Spanish" influenza, although there is evidence that it, too, really originated in Western Asia.

Symptoms: The germ of the disease is very difficult to find. In fact, the identity and exact nature of the germ cause is still an unsettled question. The disease is most readily transmitted just before the person feels that he is sick, and during the first day or two after the beginning. Nurses working with influenza patients escape the disease for weeks, and then, on coming in contact with a case just before or just after the onset, may contract the disease immediately.

The first symptoms are chill or chilliness, and violent aching and pains in head, back, and limbs. There may be cough and expectoration, with pain in the chest; but these symptoms are not commonly very marked at first, becoming more so later in the disease. There may be nausea and vomiting, or these with diarrhea added. In the latter case, these symptoms are often severe and very persistent. Generally there is constipation. The chilliness and aching are very much like these same symptoms in acute tonsillitis. In fact, in the last epidemic, the two were occasionally confused. But in influenza alone, there is no true tonsillitis. In many localities, the beginning of the epidemic of influenza was preceded for about three weeks by a light but definite epidemic of gastrointestinal disorders, with diarrhea. When these disorders accompanied influenza, the cases were very much more difficult to treat.

When pneumonia appeared with the onset of the influenza, or within a short time afterwards, a fatal result was almost certain to follow. However, the greatest number of cases of pneumonia developed from the third to the fifth day, or when, after getting somewhat better, or after apparent recovery, the patient got out of bed before he should have done so. Such cases of pneumonia were severe, and often greatly protracted.

For two or three years after a pandemic, less extensive epidemics usually occur. Still, the disease is prevalent to some extent every year, mostly during the winter and spring months. It might be well to call such cases gripe, reserving the term "influenza" for the great pandemics, as there seems to be much less danger of pneumonia and fatal complications with the former.

Very few persons are immune; but those who are well and strong, living an out-of-door life, with simple, natural, and sufficient dietary, and who are free from bad habits and undue fatigue and nerve strain, are certainly less susceptible than others. The disease is definitely worse during the cold and changeable weather of winter and spring. In the pandemic of 1918, it did not greatly abate until the late spring and summer of 1919, and appeared again in the winter of 1919 and 1920, but with less severity and fewer persons attacked.

Treatment: The following are the essentials of treatment: The patient should go to bed and remain there until the fever has entirely subsided, and from three to five days after the temperature has become normal. There must be plenty of bedding, and hot water bottles should be used as needed. The room must be kept warm, especially at night. In the winter, fires should be kept burning night and day. At Camp Wheeler, Macon, Georgia, the plan of treatment was changed, in the midst of the epidemic, from the open pavilion, cold-air plan, to the closed-ward, warm-air plan; and as a consequence, the mortality fell from 13.9% under the former plan to 3.2% under the latter.

The patient should wear warm, close-fitting sleeping garments. The two-piece pajama suit is best for both men and women; and in many cases, bed socks should be added to this. For children and those who are unconscious or delirious, the pneumonia jacket should be used, as it is difficult to keep such patients covered about the chest and the shoulders. Fresh air should be freely admitted, but drafts must not be allowed, and the fresh air must be warmed before it reaches the patient. The patient must never be left uncovered, and the use of bedpans and urinals should be insisted upon, and under no circumstances should the patient get out of bed. As far as possible, these matters should be attended to under cover; and this applies also to treatment, during which the room should be made much warmer than usual. The bowels should be moved by cathartic or enema, or both. Provision should be made for free water-drinking.

Food: During the first day, little or no food should be given, and afterwards a liquid diet should be followed until the temperature is nearly normal. Light cases may have soft food and toast; but in the severer cases, a strictly liquid diet should be maintained. This may be given from three to five times a day, if required. Between meals, fruit juices may be used to advantage. The liquid food may consist of malted milk, cream *purée* soups of peas, barley, rice, and so forth. Eggnogs may be used. Milk is a very good food, but is likely to cause trouble in fifty per

cent or more of influenza cases. Soft foods and toast may be added as soon as the temperature declines to 100° or 101°. The two extremes of diet — starvation and solid food — should be avoided. With infants and children, liquid food must be given frequently and liberally, particularly if the illness is at all prolonged.

Medicine: In the treatment of influenza, medicines other than cathartics or very simple, harmless remedies, have proved useless or injurious. The intelligent use of hydrotherapy has done more to reduce the death rate, and lessen the seriousness of the disease and its complications, than any other plan of treatment. While the disease has indeed baffled the skill of the wisest and most experienced physicians, yet there are certain principles upon which treatment must be based that are so simple that all should become familiar with them. To obtain the best understanding of these principles, a few facts relating to them should be known.

INFLUENZAL PNEUMONIA

This disease is marked by great weakness of the blood vessels, and instability and unbalance of the circulation, so that congestion of the internal organs, especially of the lungs, is always present; and on the slightest exposure to cold, this becomes extreme and pneumonia results. This pneumonia, in the majority of cases, differs somewhat from ordinary pneumonia, and is best described as acute inflammatory dropsy of the lungs. Fluid, often blood-tinged, fills the air sacs and the smaller bronchial tubes.

The disease does not confer any lasting or certain immunity upon those who have had it. Individuals have been known to have from two to even six attacks in a few weeks or months of time. This failure is probably in part at least due to the deficiency of white cells in number and activity in this disease. In case of true and uncomplicated influenza, the number of white cells in the blood is a third or a half less than in health, and very much less than in most infectious diseases, for the white cells are usually increased in number by infections. (See chapter 35.)

Treatment: As here outlined, the treatment combats the internal congestion and helps to restore the balance in the circulation. The first treatment should be a vigorous sweat, given with the patient in bed, and in a warm room. Tub baths are not best for this purpose, as the patient is likely to be chilled in getting out; nor should he sit up while taking the sweat.

Under "Pneumonia" (see first part of this chapter), the treatment is outlined in detail. The sweating is accomplished by means of a hot foot bath (in bed), with fomentations to the

front of the chest at the same time. The patient is covered warmly, and the hot applications are kept up until profuse sweating results. Drinking one or several glasses of hot lemonade or other hot beverage will greatly help in producing free perspiration. Cold compresses may be used on the head if the temperature is high. After the patient has perspired freely for five or ten minutes, the treatment should be concluded by a cold mitten friction. This is given by uncovering and treating one part at a time, as directed in chapter 10. It is very important that this be done quickly, vigorously, and without exposure at one time of more than the part under treatment. The last fomentation is not removed until the chest is reached with the cold mitten friction, and the hot foot bath is not removed until the legs are reached. This keeps the patient warm and prevents chilling while the cold friction is given. Afterwards the patient is warmly clothed with the pajama suit and anything else needed.

There will be some perspiring afterwards, but the perspiration may be wiped off under cover as often as necessary. The patient may now be allowed to sleep a number of hours or overnight. Each forenoon, a very similar treatment should be given, but without the hot drink, and with only a brief hot foot bath, and only three fomentations. No attempt should be made to produce sweating. The treatment will be much shorter, and should be concluded with the cold mitten friction as before.

As will be readily seen, such treatment draws the blood to the surface, and thus lessens the congestion in the lungs, while the cold friction tones up the blood vessels and the circulation, so that the blood is made to remain in the surface and circulates more evenly. It also greatly increases the resistance to infections, by increasing the number and germ-destroying activity of the white blood cells.

In the afternoon or the evening, fomentations may be applied to the side of the chest for pain or pleurisy, or to the front of the chest for cough or bronchitis, or to the back for headache or to promote sleep. If the patient is very ill, the forenoon treatment may be repeated in the afternoon. A warm sponge bath in the evening is very restful; or an alcohol or witch-hazel rub may be used, if desired. This program is kept up until the patient is well.

Do not use ice bags or cold compresses except to the head when the fever is high. Repeated sweats are not needed, and are weakening. Where many patients are under the care of one nurse or attendant, it is best to give only the most necessary treatment; for those who are not seriously ill will recover by being kept in bed with ordinary good care without hydrotherapy,

although even these will not be as comfortable as those who can have treatment daily. These plans for treatment may be varied to suit the convenience of the home and the needs of the case.

Some physicians will follow a slightly different plan of hydrotherapy, but the same general principles should govern the treatment. The cold mitten friction is not a cold bath, and should not be confused with the cold treatment given for typhoid fever. The effect is entirely different. The lowering of the fever following fomentations and the cold mitten friction in influenza, is due to the relief of the internal congestion, and the restoring of the circulatory activity and balance. It is not caused by the removal of heat from the body by long contact with cold water, as in typhoid fever.

If the treatment outlined above is carefully and intelligently given, and the patient remains in bed the required length of time, avoiding chilling and exposure, very few cases of pneumonia will develop.

Where pneumonia has developed, and the patient is seriously ill, the treatment may profitably be varied as follows: Two or three fomentations should be applied to the back over the lungs, and a cold mitten friction given to the entire back immediately after the last fomentation is removed. Following this, the patient may turn on the back, and a hot foot bath or a hot leg pack, or fomentations to the feet and the legs, should be given, with a cold mitten friction to the same parts on the removal of the hot applications. Next apply in succession two or three fomentations to the chest, and finish with a cold mitten friction to the arms and the entire front of the trunk. The treatment may be begun with this part if thought best. This divides the treatment into three parts, so that any one, two, or all three may be given at a time, according to the strength and reactive ability of the patient.

This treatment should be given twice a day in pneumonia of average severity. Part of the treatment, say either to the back or to the legs, may be repeated in the evening. Cough may be relieved by fomentations to the upper chest in front; pain of pleurisy, by fomentations to the area of pain. Restlessness and sleeplessness are greatly lessened by fomentations to the back or the spine. When the temperature is high, ice bags or ice compresses to the head are of great benefit. When the heart and the circulation appear weakened, the cold mitten friction is of the greatest value. Strychnine for the heart is not only useless, but positively harmful; and its frequent repetition, together with the continued use of morphine to secure rest, is responsible for many deaths.

Diseases of the Throat

SORE THROAT

Acute sore throat, or pharyngitis, may be due to cold and exposure. It is associated also with digestive disorders. It may be only a part of an acute cold involving the nose, the throat, and later the bronchial tubes. Sometimes it ends in temporary hoarseness (acute laryngitis); or the catarrhal inflammation may extend up into the Eustachian tubes, causing temporary impairment of hearing. Such attacks frequently repeated lead finally, after many years, to catarrhal deafness, with progressive and permanent deficiency in hearing.

A *chronic sore throat*, with hoarseness, is common in clergymen, auctioneers, and others who use the voice too much. This chronic pharyngitis and laryngitis is known as "clergyman's sore throat." A similar sore throat is almost constant in smokers, and in those who habitually use hot, highly spiced foods or alcoholic liquors.

Treatment: See pages 479-481.

TONSILLITIS

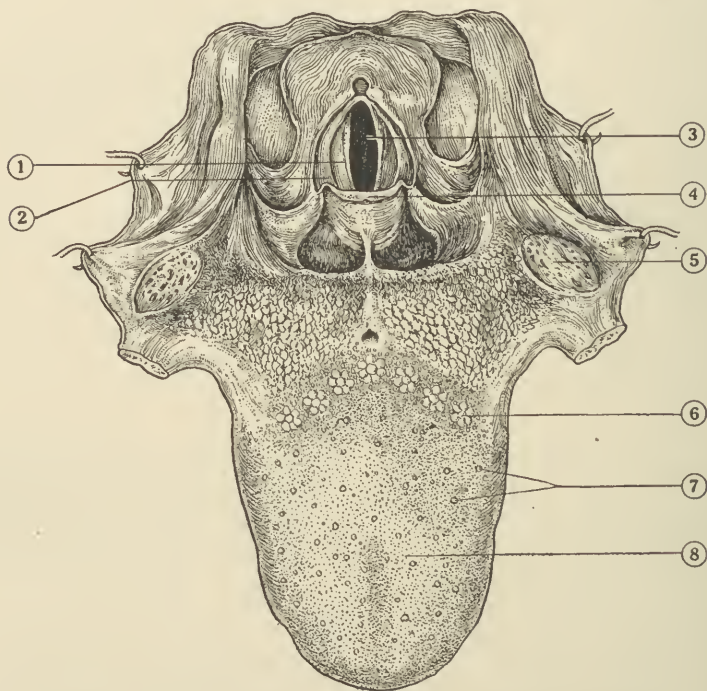
Acute tonsillitis is a very common disease among young people. Certain persons seem predisposed to repeated attacks. This tendency decreases with age. Epidemics of tonsillitis occur often in fall, winter, and spring. These epidemics spread rapidly wherever people congregate in close rooms, as in schools and theaters. They may be traced also to milk infection, or the contagion may be dust-borne.

An attack of tonsillitis is a frequent forerunner of rheumatic fever (inflammatory joint rheumatism). It may also be followed by acute rheumatic infection of the heart valves, by red, boggy swellings under the skin (erythema nodosum), by St. Vitus's dance, or by acute inflammation of the kidneys (Bright's disease). In these diseases, the germ (streptococcus) gains entrance to the body by way of the tonsils. These conditions are discussed under "Focal Infection." (See chapter 76.)

Symptoms: In acute tonsillitis, the onset is with chill, or chilly feelings, and aching pains in the back and the limbs, much like those of gripe or influenza. The fever rises rapidly to 103°, or even as high as 104° or 105°. There is soreness of the throat and difficulty in swallowing. The tongue is coated and the breath foul. The tonsils are swollen and red, and covered with droplets

of creamy pus, or with small whitish patches. The glands of the neck may be swollen slightly. In some cases, the entire throat is bright red (streptococcus sore throat), and there may be a brilliant red rash over the chest or the entire body, very much like the eruption of scarlet fever.

In tonsillitis, the appearance of the throat is different from that of diphtheria. (See illustrations in color section, page 24.)



TONGUE, TONSILS, AND THE OPENING INTO THE LARYNX

- | | |
|----------------------|-------------------------------------|
| 1. True vocal cord | 5. Tonsil |
| 2. False vocal cord | 6. Circumvallate papillae of tongue |
| 3. Opening of larynx | 7. Fungiform papillae of tongue |
| 4. Epiglottis | 8. Filiform papillae of tongue |

An attack of tonsillitis usually lasts from five to ten days.

Treatment: See pages 479-481.

QUINSY

This is an inflammation of the tonsil in which an abscess forms within, behind, or beside the tonsil. The throat on one or both sides is greatly swollen. The tonsils may touch in the middle

line, or one may be so swollen as to push the uvula (palate) over to the other side. There is much pain, and great difficulty in swallowing. The glands of the neck enlarge, and the patient can scarcely open the mouth. In two or three days, the location of the abscess becomes apparent. The fever is very high and the prostration extreme.

Treatment for Sore Throat, Tonsillitis, and Quinsy: If a sore throat is part of a general cold, the treatment directed for a cold (chapter 56) should be carried out in addition to the local measures. Fomentations to the throat are among the best means of relieving the soreness. About three or four of these should be used; and if they are given on retiring, a heating compress should be applied to the neck, and left on overnight. This is simply the household remedy ordinarily called "a cold cloth to the throat."

It consists of three or four thicknesses of cotton cloth folded so as to be two or three inches wide, and long enough to go around the neck and lap over double in front. This is wrung nearly dry from cold water; and after being applied around the neck, it is covered with a wider and much thicker flannel cloth, and pinned snugly in place. The wet cloth should dry out by morning. This heating compress is much more effective than coal oil or turpentine, and will not blister the skin.

To cleanse the throat and help relieve the soreness, a gargle should be used. This may be Dobell's solution (an alkaline antiseptic wash), diluted with an equal quantity of hot water. About half a glassful may be prepared and used at one time by repeated gargling. This should be done three times a day, or as often as every two or three hours if necessary.

This medicine can be obtained in liquid or tablet form at any drug store. In children who will not gargle, it is well to spray the throat with the alkaline antiseptic wash. This may be put into the atomizer full strength. The following prescription is more effective in relieving the soreness. It is also very useful in acute tonsillitis.

R

Carbolic acid	2½ drams
Glycerin	1 ounce
Liquor antiseptic (U. S. P.)	up to 6 ounces

Directions: Put 1 dessert-spoonful in ½ glass of hot water. Gargle three or four times a day.

Painting the throat with 10% or 20% argyrol is very useful in relieving a sore throat that does not yield to other means of treatment. Tablets or lozenges of chlorate of potash often give relief.

The tonsil may be swabbed with a cotton applicator dipped in peroxide of hydrogen, and then the gargle used after this preliminary cleansing; or the following solution may be swabbed on the tonsil, full strength or diluted, and used as a gargle. Children object to it because of the taste.

R

Carbolic acid	2 drams
Tincture ferric chloride	3 drams
Glycerin	1 ounce
Liquor antiseptic (U. S. P.)	up to 3 ounces

Directions: Swab on tonsil full strength, or put 1 dram in $\frac{1}{2}$ glass hot water for gargle.

Tablets of acetyl-salicylic acid (5 grains), commonly called aspirin, give very great relief. One or two tablets may be used at a time; and for children, smaller amounts. They should not be repeated oftener than one in three or four hours. They have the disadvantage of causing profuse sweating with many persons.

General treatment in tonsillitis is just as important as local treatment. It may well begin with a brisk cathartic (see chapter 12), or an enema, or both. This may be followed by a vigorous sweat produced by means of a hot foot bath and fomentations to the throat. (See chapter 10.) If there is likely to be difficulty in inducing a sweat, two tablets of aspirin may be given twenty minutes before treatment is begun. The head should be kept cool with cold compresses or ice bags; and after profuse sweating has been produced, a vigorous cold mitten friction should be given, as directed in chapter 10.

Nothing gives more relief from the pain in the throat than the alternate application of fomentations and the ice bag. The former should be very large and very hot, and the latter applied over a thin cold compress. Each may be left on eight or ten minutes at a time, and three or four complete changes made. This treatment may be given two or three times a day.

The diet should be liquid and very light for the first two or three days. Hot liquids often give some relief in swallowing, but bits of ice in the mouth are usually better. The aching in the back and the limbs is generally relieved to a great extent by the initial sweating treatment. If further treatment is needed for the backache, fomentations may be applied to the spine. For the high fever, or for delirium, use ice compresses or the ice bag to the head, and encourage free drinking of water and mild fruit juices.

In cases of quinsy, the same local treatment may be employed that is advised for tonsillitis. A physician should be in attendance, and the abscess should be lanced as soon as possible.

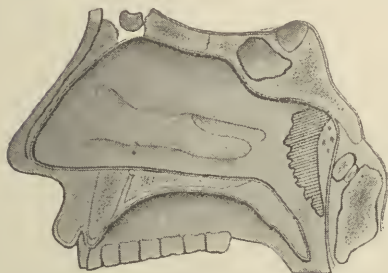
Sometimes it is necessary that lancing be repeated. At first, the pus may be very thick and hence escape with difficulty. After lancing, the use of peroxide of hydrogen diluted with an equal quantity of water, as a mouth wash and a gargle, is very helpful.

Either children or adults that suffer from repeated attacks of sore throat or tonsillitis should have the tonsils removed. This advice applies also to those who are subject to quinsy. The greater danger from these diseases is not in the local inflammation in the throat, but in the diseases that tonsil infections cause, such as rheumatism, heart disease, and Bright's disease.

ENLARGED TONSILS AND ADENOIDS

These conditions are very common in children from five to ten years of age. Though tonsils and even adenoids are normal

to the body, yet, when these become unduly enlarged, they lead to obstruction in the throat and the back part of the nasal cavities, so that mouth-breathing results. Enlargement of tonsils and overgrowth of adenoids are usually present together. The obstruction may be enough to do distinct harm, but not enough to cause mouth-breathing. Or the mouth-breathing may occur only at night. The



The shaded portion shows the position of adenoids in the passageway between the nose and the throat.

child does not obtain sufficient oxygen to meet the needs of the body, so the growth and the nutrition are deficient. The mind also suffers, and the child is regarded as mentally dull. Children who would otherwise manifest average mental capacity get very poor grades in school and are often also considered inattentive or even disobedient.

These characteristics may be entirely due to defective hearing brought about by the partial closure of the Eustachian tubes to the ear because of the large mass of adenoids in the throat. In one case in which a child of ten years could scarcely hear a watch tick at a distance of one or two inches from the ear, the hearing was entirely restored by the removal of the large tonsils and adenoids. Acute earache followed by ruptured eardrum and a "running from the ear" is often caused by obstruction from adenoids, and is promptly cured by removal of the adenoids if these conditions have not lasted too long.

Mouth-breathing not only leads to poor health and poor nutrition, with mental dullness and slowness, but also, when severe, to permanent deformity of the chest. "Pigeon breast," or "funnel breast," and "barrel chest," are due wholly to obstruction from adenoids and large tonsils.

Besides causing obstruction, the large tonsils often contain little pockets full of foul, decomposing, cheesy matter with continual low grade infection; and this lowers the vitality of the entire system. Such a condition gives rise to frequent attacks of "glandular fever," with swollen neck glands and stiff neck, or attacks of "stomach or bowel upset," with fever, foul breath, *et cetera*. Such tendencies are often entirely eliminated by removal of the tonsils. Other diseases caused by infected tonsils are considered in chapter 76. The routine examination of school children by school nurses and physicians has done much to discover and remedy these defects, and thus prevent serious and permanent damage in after life. The medical inspection of school children should be encouraged by every parent.

The removal of diseased or enlarged tonsils does not in any way impair the voice or interfere with singing, and frequently results in improvement of these. The tonsils should not be burned out or cauterized, as this process leaves a hard scar on the surface, which "holds in" the infection tighter than before, and so may make matters worse rather than better. If there is to be an operation on the tonsils, they should be entirely removed. If they "grow again," this is evidence that they were not entirely removed. Pieces of tonsil thus left, though very small, may be a source of much trouble. Adenoids thoroughly removed, rarely return, although this does happen in exceptional cases.

The results of removal of the tonsils and the adenoids often appear quickly and are highly gratifying. The child eats and sleeps better, is less nervous and fretful, acquires a better disposition, and begins soon to make better progress in school. The growth is often wonderfully rapid within the first year after removal of the tonsils. Colds, coughs, and slight digestive disorders are much less frequent, less severe, and last a shorter time.

HAY FEVER

This is a disease of the upper air passages, produced by the action of the pollen of certain plants upon an oversensitive mucous membrane. There are two forms, one occurring in the spring, called also "rose cold," and one occurring in the late summer and the early fall. The latter ends with the first frost. Among the grasses and plants that cause hay fever are rye, ragweed, golden rod, asters, and chrysanthemums. Residents of

cities and those who are highly nervous are most susceptible. The disease may end in an attack of bronchial asthma, and the two are often associated, as both are based upon a nervous predisposition and an unusual susceptibility to small amounts of certain albumins. So small an amount as two or three pollen grains may bring on hay fever. The symptoms are not unlike those of an ordinary cold in the head (*coryza*), but with more headache, distress, and depression of spirits. The eyes are suffused, red, and irritated. The nasal passages are red and swollen. There is sneezing and often coughing. These conditions last until the passing of the season for the blooming of the plant that causes the disease, or until a heavy rain or frost interferes with the spread of the pollen, or until the patient changes location. The dry air of a mountain height seems to give the greatest benefit, though any change that takes the afflicted person away from the active cause will result in decrease and final cessation of the symptoms.

Local remedies are helpful in the relief of symptoms, but permanent cure is attained only by a permanent change of residence or by the use of a specially prepared serum or antitoxin. Dunbar's serum (*pollantin*) is said to give successful results in 60% of cases, and some benefit in 30% more. Graduated doses of vaccine prepared from certain pollens are often very beneficial. These should if possible be begun before the time for the appearance of the disease. In this way, attacks may be warded off entirely, or made much lighter and of shorter duration. Such remedies must, of course, be administered by a physician.

LARYNGITIS

There are several forms of laryngitis; but hoarseness of the voice, and often inability to speak above a whisper, are symptoms characteristic of them all. An acute inflammation of the larynx is common with a cold, acute sore throat, and also acute bronchitis. In these cases, it is only a part of a general acute catarrhal inflammation, and is treated, like these conditions, by such general measures as sweating followed by a vigorous tonic cold rub. Fomentations to the throat give great relief, and nothing is more effectual than the heating compress applied to the throat overnight. (See chapter 10.) These measures applied two or three nights in succession give prompt relief in most cases of acute laryngitis.

Chronic laryngitis may be due to tobacco-smoking, or the inhaling of irritating vapors or dust. It may be a result of excessive use of the voice, as in clergyman's sore throat. It is also caused by tuberculosis or syphilitic disease of the vocal cords.

Any case of hoarseness lasting longer than a few days should be investigated by a specialist to determine these graver causes.

In case of clergyman's sore throat, nothing but rest will suffice to relieve the condition. Recovery may be hastened by treatment indicated for acute laryngitis. The inhaling of such remedies as balsams, copaiba, oil of eucalyptus, menthol, or compound tincture of benzoin, from a nebulizer, is helpful in giving relief. (See chapter 12.) Tuberculosis of the larynx is a serious disease, and frequently accompanies tuberculosis of the lungs. Recovery is not common, and the outlook is nearly always bad.

DIPHTHERIA

Diphtheria is an acute infectious and contagious disease due to the diphtheria bacillus. No age is exempt, but it is rare before one year. It is marked by the presence of a dirty white or grayish membrane, usually in the throat. This membrane may grow in the nose or the larynx (membranous croup) or the bronchial tubes, rarely elsewhere in the body. Except where the membrane mechanically obstructs breathing, the severe symptoms of the disease are caused by the toxins produced by the germ and carried throughout the system by the circulation. Diphtheria is one of the few infectious diseases for which medical science has discovered a direct antidote or antitoxin. A very large majority of cases of diphtheria treated early with large doses of diphtheria antitoxin recover. Healthy persons taking antitoxin as a preventive avoid contracting the disease.

Injurious effects of antitoxin are very rare, and are not to be compared with the extremely harmful results and the very high death rate of diphtheria itself where antitoxin is not given.

Antitoxin is prepared from the blood of healthy horses that have been made resistant to the disease. A few persons may be oversensitive to this horse serum. This is true of those who have troublesome symptoms caused by the odor from horses, and often of those subject to asthma. In the treatment of such persons, any serious results from the use of horse serum may be avoided by giving a very small dose and waiting a half hour before the remainder of the first dose is injected.

In the presence of an epidemic of diphtheria, every case of sore throat and even every other acute illness should be promptly investigated by a physician. Swabs and cultures taken from the throat should at once be sent to the nearest laboratory or health office. The germ may in this way be found before the false membrane forms, and many persons can be treated early in the disease, before grave symptoms develop. (See color plate, page 25.)

Diphtheria is carried by clothing, even months after use; by persons in contact with those having the disease; by domestic animals, as the cat; or by such foods as milk. No dish, clothing, or other article is safe until most thoroughly fumigated or boiled. Persons who are not themselves susceptible, or who have had the disease and recovered, may carry the infection for months or years afterwards. Such persons are called carriers, and they must be isolated until the germ can no longer be found in throat or nose, or in any catarrhal discharge. Antiseptic gargles must be used; and it may be necessary to remove the tonsils, if the germ does not quickly disappear, or to treat other lodging places of the bacilli.

The Schick Test. In the prevention of diphtheria, notable advance has been made by the introduction of the Schick test. This is a simple, harmless skin test, which may be applied by any physician. It reveals whether or not the individual is susceptible to diphtheria. If the test indicates that the person is naturally immune, there is no need to give the antitoxin, as the person would not contract diphtheria even though directly exposed to it. In case of exposure to diphtheria, or where a widespread or serious epidemic exists, antitoxin should be given as a means of prevention, to those who react positively to the Schick test.

The appearance of the membrane in the throat is quite characteristic, but dependence should not be placed upon this alone. It is grayish or dirty white. It grows in the region of the tonsil, but is not limited to the tonsil, as it advances to other parts of the throat. In ordinary tonsillitis, the whitish material on the tonsil is in small spots instead of a continuous sheet of membrane, and it does not extend beyond the tonsil. A false membrane may form in tonsillitis even though no diphtheria exists. For all these reasons, the only safe method of diagnosis is by culture. Illustrations in the color section, page 24, show the appearance of the throat in tonsillitis and diphtheria.

Treatment: As has already been stated, the use of diphtheria antitoxin is the most important element in the treatment of the disease. The careful physician will give it as early as possible, and repeat its use at frequent and proper intervals until the symptoms abate and the membrane in the throat shrivels and loosens. From 5,000 or 10,000 to 50,000 units of antitoxin may be needed.

The heart and the blood vessels, the kidneys, and the nervous system bear the brunt of the infection. For the rapid heart action, the ice bag to the heart and the cold mitten friction are very useful. To relieve the kidneys, copious water-drinking is most helpful. For delirium, cold, or ice compresses to the neck

and the head will aid in giving relief. The diet should be liquid (such as milk), and should not be pushed unduly. Ice cream is very grateful to the patient.

For a local antiseptic in the throat, Loeffler's solution is probably the best. It may be obtained at any drug store. Spread it over the throat and the membrane by use of a soft cotton swab, and repeat the application from two to four times a day.

As the circulation is very much weakened by the diphtheria poison, great care should be exercised that the patient does not get up too soon or exercise unduly after apparent recovery. Various forms of paralysis, especially of the throat muscles, are not uncommon after diphtheria; but the outlook for full recovery is usually good.

Membranous croup is diphtheria of the larynx. Because of the small opening between the vocal cords, the growth of the membrane may so obstruct the breathing that the sufferer will die of suffocation. If the patient shows any blueness of the lips or difficulty in breathing, a physician should be summoned at once. The insertion of a special metal tube in the larynx through the mouth will save the patient from such a distressing death.

None but the nurse or attendant should enter the sick room, and she should always wear a loose outer gown such as is worn by nurses in hospitals. On leaving the room, she should remove the gown, and wash the hands with soap and running water. Alcohol or other non-irritating antiseptic may also be used on the hands after washing. When the patient has recovered and the throat is free from diphtheria germs, as indicated by repeated laboratory tests, a thorough bath should be taken and an entire change of clothing made. The sick room should then be disinfected.

WHOOPIING COUGH

Whooping cough, or pertussis, is a contagious catarrhal disease of the respiratory mucous membrane (nose, throat, and bronchial tubes). Its distinguishing feature is the well-known "whoop." The disease occurs principally in winter and spring, and affects mostly children from six months to five years of age. Younger infants may be affected, and adults and even the aged are not exempt. One attack usually gives immunity, but occasionally a person may have a second attack. The disease is more serious in cities and in overcrowded and unhygienic quarters. It is more severe in the winter, probably because at this season children are kept indoors more closely.

Following an attack of measles, or in delicate, undernourished children, it is more likely to end in broncho-pneumonia, which is the principal cause of death in cases of whooping cough.

It is conveyed direct by one suffering of the disease. The most contagious stage is early in the disease, even before the whoop appears. An authentic case is recorded in which whooping cough was contracted by contact with the clothing of children having it.

Symptoms: The first stage of the disease begins in a week or ten days after exposure. This first or catarrhal stage lasts from one to two weeks before the whoop appears that marks the beginning of the paroxysmal or spasmodic stage. During the catarrhal stage, the eyes may be red and the child may seem to have a cold in the head. There is sneezing and watering of the eyes; and in a few days, a persistent cough develops, which is particularly troublesome at night. This latter feature, lasting a week with no improvement, but rather getting gradually worse, should always arouse suspicion of whooping cough.

In about two weeks from the beginning of the first symptoms, the typical whoop appears. At first, this whoop may occur only once or twice in a day or two. As the disease progresses, the whoop occurs with every spell of coughing. It is produced by a deep inspiration at the close of a series of explosive coughing efforts. With these spells of coughing, the child may seem almost suffocated, the face becomes reddened or bluish, and the veins stand out on the head and the neck. The cough is relieved by the raising of a tough mucus. This may also be accompanied by vomiting. If this is frequent, the child will have difficulty in retaining enough food to keep up its nutrition.

The paroxysmal stage lasts from three to six weeks. The cough may not entirely disappear for several months, and is especially likely to reappear with a chilling or a fresh cold. The disease is not highly contagious after the first two weeks.

Treatment: There is no specific cure for whooping cough, and parents should be warned against the too free use of drugs. Narcotic drugs used to relieve the cough may produce drowsiness or unconsciousness. Belladonna may cause delirium; and because it widely dilates the pupils of the eyes, permanent damage to the sight may result from exposure to bright light. The stomach may be upset, and other harm follow, from the use of quinine. Patent medicines should not be used at all, and medicines prescribed by the physician should never be given oftener than directed, neither should they be used for other children, unless explicitly directed by the physician.

Much can be done to make the disease less severe. Hygienic means are of great importance. If the weather permits, the child should lead a quiet out-of-door life. Sunshine and fresh air are very beneficial. Much dampness, dust, and winds should be

shunned. The bedding should be aired, exposed to the sunlight, and then warmed before the child is put to bed. All excitement should be avoided. The diet should be light but nourishing. An exclusive milk diet is often best for younger children, especially if vomiting occurs often.

The inhalation of medicated steam is very helpful. Creosote, oil of eucalyptus, and compound tincture of benzoin are used for this purpose. A teaspoonful of any one of these may be put on a pint of boiling water and the steam inhaled. The writer has found frequent use for a teaspoonful of oil of eucalyptus in one ounce of compound tincture of benzoin, a teaspoonful of the mixture being used as directed above. This may be repeated several times a day, or only at night when the coughing is more violent.

Fomentations to the chest and the throat, if carefully given in a warm room, are also an aid in controlling the accompanying bronchitis. There is no objection to camphorated oil rubbed on the chest after a series of fomentations given at bedtime.

A vaccine has been prepared from the germ that causes the disease. Repeated doses of this vaccine, given at proper intervals, seem to lessen the severity of the disease and possibly also the duration of the paroxysmal stage. It may be used with benefit for infants as young as three months of age. The results are much better if the treatment is begun early in the catarrhal stage, before the whoop appears. Where there are several children in a family, a diagnosis can often be made within a week of the onset, and thus much time be gained.



Inhaling Medicated Vapor

Diseases of the Air Passages

COUGHS

Cough is not always attributable to bronchitis, though this is the most common cause. A cough lasting a few days may be present in acute colds, sore throat, tonsillitis, and at the beginning of, or during, acute fevers, such as measles, whooping cough, typhoid fever, broncho-pneumonia, pleurisy, influenza, *et cetera*. A persistent or chronic cough may be caused by infected tonsils, a long uvula, chronic sore throat, chronic bronchitis or pleurisy, or tuberculosis of the lungs. A cough due to a cold should clear up in a few days if treated promptly; and any cough lasting longer than a week should have a careful investigation to determine its cause.

It is unwise to take "cough sirups" for a cough, the cause of which has never been investigated by a physician. To pass lightly over such matters with the excuse, "Oh, I have a cough every winter," or, "I always cough a long time with a cold," often means to remain in careless ignorance of such a serious disease as tuberculosis. Many cases of tuberculosis have their beginning in a cold that hangs on several weeks. A winter cough may be a symptom of tuberculosis, or only of chronic bronchitis. Nothing but a thorough examination will reveal its true nature. The treatment of colds is given in chapter 56, and tuberculosis is discussed in chapter 47.

ACUTE BRONCHITIS

An acute bronchitis is usually the result of taking cold. Occasionally it is due to inhaling noxious gases. It accompanies measles, broncho-pneumonia, and influenza. A sweating treatment, as recommended for pneumonia or influenza, will generally relieve an acute bronchitis readily. (See chapter 43.) Fomentations to the chest may be given each evening afterwards until the cough is entirely gone. The inhalation of medicated steam (see under "Whooping Cough," chapter 44) is very helpful in relieving the severity of the cough. In children, the use of a flannel chest pack (see chapter 10) at night, after the chest has been rubbed with camphorated oil, helps to relieve the bronchitis and the cough. When the pack is taken off in the morning, the chest should be rubbed with the hand dipped in cold water; or fomentations may be used, with the wet hand rub to the chest after the last fomentation. These treatments, together with the

hot foot bath and the cold mitten friction, or the hot tub bath with a cold pour or rub at the close, will ordinarily be sufficient to relieve an acute bronchitis.

CHRONIC BRONCHITIS

A chronic bronchitis may be the result of repeated attacks of acute bronchitis. Those who use much meat or greasy food, especially fried fat pork, or those who use irritating condiments, such as pepper and mustard, are very likely to have chronic bronchitis, if the lungs are at all susceptible to congestive catarrhal difficulties and infections. Much pastry and rich desserts, and the free use of confections, also favor catarrhal diseases. A radical reform in diet is one of the largest elements in the relief of chronic bronchitis. A warm, dry climate should be sought by those who have this disease in a severe or very chronic form. In the winter, warm clothing is of special importance. Any treatment that improves the circulation is a very great factor in relief. Hot and cold foot baths, fomentations to chest, abdomen, or spine, followed by cold mitten friction, salt glow, or hot and cold spray, and also the revulsive compress (see chapter 10) to the chest, stimulate the circulation in the skin and the limbs, and decrease the congestion in the lungs.

Many cases that are thought to be chronic bronchitis are actually tuberculosis of the lungs. Where there is a persistent cough with the raising of sputum, it is most important to determine whether tuberculosis is at the bottom of it.

In cases where it is clearly proved that tuberculosis is not present, evidently there is infection of some other type in the bronchial tubes. In such cases, treatment by vaccines is often effective. This is usually best given with "autogenous vaccines." By this is meant a collection of bacteria that are obtained from the patient's sputum, grown in artificial culture, and then killed and prepared for injection. This, of course, must be done in a bacteriological laboratory. In other cases, "stock vaccines" are used.

BRONCHIAL ASTHMA

Asthma is a disease in which attacks of labored breathing are associated with spasm of the bronchial muscles and congestion and swelling of the mucous membrane of the bronchial tubes. It is based upon a decided nervous predisposition in all cases. The exciting cause may be a cold, hay fever, the inhaling of dust, or the odors from animals, such as the horse or the cat. Fright or other sudden emotions may bring on an attack. A single attack may last for hours at a time, or it may return each night for several nights in succession. The patient is compelled to sit up

in order to breathe. The chest and all the muscles of respiration move violently. With each expiration, there is a peculiar wheezing sound. The face becomes pale and anxious. The hands and the feet may be cold. The cough is very tight and dry, and the expectoration is a scanty, tenacious mucus. After a number of hours, the patient may sink exhausted to sleep, or the attack gradually abate. Overeating, or the use of certain foods, may bring on an attack. In long-standing cases, there is chronic bronchitis, with cough, and a rounded barrel-shaped chest.

The treatment of asthma is a difficult matter. The diet should be carefully regulated to avoid spices, meats, rich desserts, *et cetera*, but should contain plenty of simple nutritious elements, such as well prepared cereals and breads, vegetables and fruits. Milk may be used freely, and eggs very moderately. The diet should not be unduly restricted. Special attention must be given to the relief of constipation and flatulence. (Directions for the treatment of colds are given in chapter 56; and of bronchitis, in the opening paragraphs of this chapter.) The patient must lead a quiet out-of-door life, with regularity of habits and freedom from excitement.

Many are relieved only by a change of residence to a drier climate at a higher altitude, preferably among the pines. The bracing atmosphere of a cold climate gives relief to some, while others are benefited by a mild, warm climate, as Southern California or Florida, or even a residence on the desert, as of the southwestern United States. The matter of climate must, however, be settled by the experience of the patient himself.

Of remedies that should be administered by a physician, hypodermics of belladonna, nitroglycerin, or adrenaline often give quick relief, the last especially, in doses of five to ten minims. Adrenaline may be used by the patient in the form of a nasal spray, alone or combined with menthol or thymol and oil of eucalyptus in albolene. Amyl nitrite may give relief. In very rebellious cases, the physician may be compelled to resort to inhalations of chloroform or a hypodermic of morphine.

Fomentations to the chest are often helpful in easing the difficult breathing. This may be preceded by a hot foot bath. A large, very cold compress applied to the chest gives relief in some cases. Between attacks, tonic hot and cold applications are beneficial in building up the patient's resistance and thus lessening the tendency to asthma.

Remedies that have once given relief may fail utterly at another time. This applies not only to medicines, but also to hydrotherapy and even to climate. Asthmatic persons who have once experienced complete relief from a change of climate, may

later be compelled to change again. Sometimes a succession of moves farther and farther from the seacoast is required. In some cases, slight operations on the nose, such as the removal of nasal polypi or large turbinates, give relief for a time. A thorough physical examination should be secured in every case of asthma, so that no contributing factors will be overlooked.

Much investigation of the subject of bronchial asthma has been made during the last few years, from which it appears that a considerable portion of cases can be materially benefited and many practically cured by the administration of gradually increasing doses of certain protein substances to which the patient is shown to be particularly susceptible. This produces an immunity or resistance to those proteins which before acted as poisons to excite the asthmatic symptoms.

The tests made on each patient will indicate which of the substances are responsible for the trouble. These proteins include many materials, among which are pollens of flowers, food proteins, and hair and feathers of certain animals, as well as various bacteria.

There are a number of physicians who are giving special attention to these tests and treatments, and many sufferers can secure relief by the help of such specialists.

Tuberculosis (General)

The present chapter and the one following deal with the infectious disease called tuberculosis. A disease caused by microscopic living organisms, or germs, is called an *infectious disease*. Many of these diseases, such as measles, smallpox, scarlet fever, *et cetera*, are easily transmitted from one person to another by close proximity, and are called *contagious diseases*. Others, including leprosy and tuberculosis, are less easily communicable. In these latter, a brief association with a person having the disease carries very little danger of contracting it.

SCOPE OF THE DISEASE

Tuberculosis may be located in various parts of the body, such as skin, bones, joints, kidneys, intestines, lymph glands, meninges (membranes) of the brain, and the lungs. The last is the most usual location, the disease in these instances being commonly called *consumption*. In many parts of the civilized world (as in the United States until very recent years), tuberculosis in all forms is the most frequent cause of death, being responsible for from one seventh to one tenth of all deaths. There are only a few other classes of disease that approach it in this respect. It is often called the "great white plague."

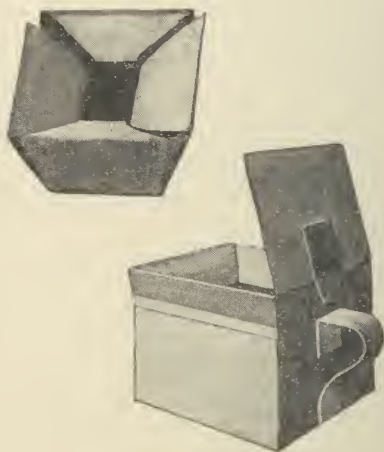
In recent years, more intelligence with reference to this disease has been spread abroad, so that many people now know that the disease is curable, and that many have the infection who do not die of it. But there is good reason for fearing it, and for studying its causes and cure, rather than looking upon it as hopelessly fatal.

Some years ago a physician was invited to bring with him some of his patients and their families to attend a popular lecture on tuberculosis. He seemed uninterested; and when asked if some of his patients did not have consumption, he replied, "Yes, but I cannot afford to tell them so." One would judge that a physician with that viewpoint must live in a community where the people look upon a diagnosis of tuberculosis of the lungs as equivalent to a death warrant, and that he himself had very little hope of being able so to guide his patients as to bring about a cure. Certainly in this age of the world, such an attitude on the part of a physician ought not to exist. In the early stages of the disease, it is curable; and the reasons why many persons who develop the disease, die of it, are, first, that it is not

recognized early, and second, that it is not treated intelligently and energetically. It is a *preventable* and *curable* disease.

Cause: The tubercle bacilli, or germs, which cause this disease, are very minute. They maintain their life for a long time outside the body, if the conditions are favorable—that is, if they are protected from bright light, and especially if they have some moisture. When exposed to sunlight and fresh air, they quickly die. It is thus readily seen that there is very little danger of contracting the disease out of doors, but that a contaminated house is dangerous.

There are several varieties of the tubercle bacillus, peculiar to different animals. Only two of these varieties attack men, the human tubercle bacillus and the bovine bacillus. The great majority (ninety-two per cent) of cases of tuberculosis in human beings, including nearly all cases of consumption, or pulmonary tuberculosis, are caused by the human bacillus. (See color plate, page 20.) A smaller proportion (eight per cent) are caused by the cattle bacillus. These are mostly in children, and are contracted by the use of milk from tuberculous cows. Infection with the human bacillus almost always comes from the sputum coughed up from the lungs of consumptives.



A Sputum Cup and Filler

Manner of Entrance of Infection. Practically always the tubercle bacilli enter the body in one of two ways; first and most important, by being breathed with the air into the lungs, where they lodge upon the walls of the air spaces or air passages and cause the disease in the lung tissues; and second, by being swallowed and finding their way through the walls of the intestines into the body. When a consumptive spits out upon the floors or other objects in a room tubercular sputum, which contains millions upon millions of the disease germs, this sputum finally dries and is ground into dust; then, by sweeping or in other ways, it gets into the air and is breathed into the lungs of people in the room. Experiments have shown that there is another very usual way for bacilli to reach the lungs. When a consumptive coughs,

great numbers of the germs are propelled into the surrounding air with tiny droplets of moisture, which float in the air for an hour or more, endangering those who breathe the air within a radius of three or four feet or more. This scattering of the germs can be prevented by holding a cloth or a handkerchief over the mouth while coughing.

Children must take into the body a greater proportion of infected material by swallowing, because of their greater carelessness with their hands, and their proneness to put all sorts of objects into the mouth. One can imagine something of the great quantity of tubercle-bacilli-laden material that must gain entrance into the mouth and digestive tract of an infant or a young child creeping or playing about on the floor of a house in which there is a consumptive who spits carelessly. Of course, the bovine tubercle bacilli are taken by children from milk and butter by swallowing these infected foods.

Recovery: One of the convincing evidences that it is possible to recover from tuberculosis is the fact, now recognized by physicians and students of the disease, that in civilized countries and in thickly populated districts, nearly all persons at some time in their lives become infected with the tubercle bacillus. This has been demonstrated beyond question by examination of the bodies of the dead in hospitals in our large cities. Other methods of examination make it plain that in the cities, a very large proportion of all children actually become infected by the time they reach the age of fourteen years. One can easily understand that if nearly one hundred per cent of all persons become infected in youth, and not more than ten per cent of people die of the disease, the other eighty or ninety per cent must recover from its effects.

These facts throw light on the very interesting question of *immunity* from tuberculosis. By immunity, we mean the resistance of the body to the disease germs that may enter the body. In a large majority of persons, the entrance of the tubercle bacilli into the body causes the formation of a small spot or focus of the disease, and the very presence of this small diseased area and the poison the germs produce in their growth, causes the body to *react* against the disease germs, so as to check their further growth or to destroy them completely. The presence of these few germs and the small spot of disease that they cause makes the body resistant or immune to the growth of other tubercle bacilli that may make their way into the lungs or other tissues. Thus the small spot of disease protects the body against a more extensive disease of the same kind.

CHILDREN AND TUBERCULOUS INFECTION

Children are frequently infected with tuberculosis. This is especially true where there are consumptives in the house who are careless; or the infection may come from tuberculous milk. Eighty per cent of the infants who contract tuberculosis in the first year of life die of it. About twenty-five per cent of children contracting tuberculosis in the second year die of the disease. If the infection takes place after the third or the fourth year, they have a much better chance for life; but tuberculosis of the bones and the lymph nodes (scrofula) develops in many cases. At least in crowded communities, as before indicated, practically all children, before they reach the age of fifteen, become infected. Obviously the great problem in children is to prevent this infection during the first two or three years of life. In the later years of childhood, as the children associate more and more with other people, the infection almost invariably occurs. After the earliest years of childhood, definite tuberculous disease rarely manifests itself, although the infection is present. Such infections, as we say, remain quiescent or latent, producing an immunity to further infections.

Later in life, from seventeen to thirty years of age, tuberculosis frequently develops. Undoubtedly the explanation of the development of consumption, or pulmonary tuberculosis, in early adult life is that the disease springs from the infection present in the body from childhood, and that the conditions in the body itself favor its development. Just why this is so, we cannot entirely explain; but indoor life, overwork, mental strain, youthful excesses, and other similar factors have their influence. The bodily resistance is weakened, and the body tissues fall a prey to the disease germs that are lying in wait in the body itself. Each year after twenty-five, the danger of developing tuberculosis lessens.

There are exceptional cases of tuberculous infection in younger or older adults, in which the circumstances unquestionably indicate that the infective organisms were introduced from the outside in large quantity — as the physician says, in “massive doses.” The following instance illustrates this: Two young men in their early twenties contracted the disease from the room they occupied. They had moved into a room that, unknown to them, had previously been occupied by a consumptive, who was a careless spitter. In a few weeks, they both developed active symptoms. With good treatment, one eventually recovered, while the other, after a few months, succumbed to the disease. Another instance is that of a family of four — father, mother, daughter of twenty-five, and son of thirty. They were all in

good health until a Negro woman with consumption was brought into the family as a servant. After a few months, the daughter and the mother in turn developed active tuberculosis and died. Some months later the son developed definite symptoms, including spitting of blood, slight fever, and a cough. The condition was recognized, and prompt treatment was instituted. Within a few months, the son was apparently recovered, and by careful management, has remained well since. Their cases illustrate infection of adults by the entrance of large quantities of the germs into the body.

PRECAUTIONS

What are the most effectual measures to be taken to avoid the occurrence and the spread of this dread disease? The disease is not hereditary in the sense that the germs are present in the body of the infant at birth. The principal reason why the children of tubercular parents so frequently become tubercular is that they contract the infection in childhood by being in such close contact with the parents. There is possibly a secondary reason, namely, that the tubercular parents transmit to their children a weakened constitution, which makes them less resistant, and more liable to succumb to the ravages of the infection; but this probably is a minor factor.

All children, then, in the first two or three years of life, should be guarded with great care, to protect them from the tuberculosis germs. This is especially needful in a family where the parents or others have consumption. Under these circumstances, the precautions that must be taken if the health and life of the little children are to be safeguarded, may seem unreasonable and to some almost cruel. The father who has open tuberculosis (who is coughing up tubercular sputum) should not live in the home where there are little children. The same, of course, applies to any other tuberculous individual. A tuberculous mother of a young infant should not nurse the baby, and should not have charge of it herself, and must not kiss it. Such a mother should herself be under treatment for her condition. The child should have its separate bed in a separate room.

The care of all infants should be planned with the end in view of avoiding danger of tuberculous infection during the first two years of life. The plans should include keeping the child away from visitors, both friends and strangers. A physician of authority has said that the old rule about children's being "seen but not heard" should be reversed as far as infants and very young children are concerned. When callers arrive, the baby should not be seen, and would much better be heard, if necessary, rather than seen.

The floors where little children play should be clean. The shoes of visitors may bring filth from the streets and contaminate the floors. Children should play in rooms protected from this. The nursery should have a smooth, clean floor. A simple and cheap plan is to provide a heavy, smooth blanket or impervious rug, and always keep it the same side up for the child to play upon.

The second point in the guarding of the young child is to make sure of uncontaminated milk. Such milk will cost more.



Underwood

Milk should be obtained only from cows that have been inspected.

It should come only from cows that are tuberculin tested and tuberculosis free, and only from dairies where cleanliness is enforced. Such milk is called A grade milk by public health authorities. If milk absolutely above suspicion cannot be secured, that used must be sterilized by Pasteurization. Six per cent of samples of milk on the market have been found to contain tubercle bacilli.

To prevent tuberculosis in older persons, two precautions are necessary. First and foremost of these is the keeping of the body in such a state of health and resistance to disease in general,

as will not allow the tuberculosis germs that are already in the body or that may enter from the outside, to gain a foothold or produce the disease. This means good food, proper rest (eight hours a night), avoidance of worry and overwork, taking a sufficient amount of exercise, living in clean, well ventilated houses, breathing fresh air, the nonuse of alcohol, and remaining free from other vices. One who must work indoors the larger part of the day, should sleep outdoors (or as nearly so as practicable) at night.

Many students break down and develop signs of tuberculosis while in school. This can be avoided by taking sufficient outdoor



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An Outdoor School for Tubercular Children

exercise and by refusing to overwork. Some students are constitutionally unable to endure work and strain that may not affect others. The second precaution is, to do everything possible to avoid conditions that will introduce into the body large amounts of infection. This must be done by refusing to live in a house where there is a consumptive who does not take adequate care of his sputum, or to live in a house or room which has recently been vacated by such a person. All consumptives should be taught and compelled to destroy their sputum by burning it.

Children of parents with active tuberculosis or who have lived in families where there are such cases, should have special care to prevent the development of the disease. In many larger communities, provision is made for such children. These provisions include schools where the children live and study largely in the open air, and are supplied with plenty of nutritious food;

and the program is arranged so they may have periods of rest, and relatively short hours for work and study. Particular attention should be given to the tonsils and the adenoids and the nasal condition, and to see that the teeth are kept in good order.

Children who have been exposed to tuberculosis should be most carefully guarded against exposure to measles and whooping cough. These acute diseases may so weaken the child that the tubercular infection gets the upper hand, and quickly carries him off.

That the infection of adults from outside sources is not very common, and that there is little danger of such infection where the simple precaution of burning all the infected sputum of consumptives is taken, is shown by the fact that nurses and doctors in hospitals and sanatoria for consumptives rarely take the disease. Such classes less frequently have the disease than do the average.

One of the most essential hygienic measures for the prevention of the spread of tuberculosis is avoidance of the raising of dust in the cleaning of floors in houses and offices and factories. Dry sweeping of floors and feather-dusting of furniture should never be allowed. A bare floor should be swept with damp sawdust, and wet pieces of paper should be scattered over a carpeted floor before it is swept. Better still, always use a vacuum cleaner. Wipe the furniture with a damp cloth. As the famous Dr. Osler says, shun the pernicious habit of "dusting."

A second hygienic measure of the greatest importance is the suppression of the fly nuisance. Flies are most effective spreaders of filth and infection, and seem to take delight in infecting our food.

A vigorous campaign for the improvement of the tuberculous situation has been carried on in civilized countries for a good many years by governmental public health agencies and by voluntary associations. The National Tuberculosis Association in the United States is accomplishing a great deal by spreading abroad information regarding the disease. And various state and local societies are bringing about definite results. These efforts are bearing fruits. The vital statistics of the United States show that the death rate from tuberculosis in the years 1900 to 1919 gradually fell from 202 in each 100,000 population to 126.

FREQUENT CENTERS OF TUBERCULOSIS

Lymph Glands. Although tuberculosis of the lungs is most common, the disease often involves other organs of the body, even when the lungs are comparatively free from the disease. Tuber-

culosis of the *lymph nodes* (lymph glands), notably those located in the region of the neck and under the jaws, is of frequent occurrence, particularly in children and young people. These have a tendency to soften and break down, and to open and discharge upon the skin surface. Formerly these swollen glands were removed by the surgeon. Nowadays they are treated less by surgical means and more by general hygienic measures, including outdoor life and abundant food, and by the use of tuberculin,¹ which seems to be helpful in these cases.

Joints and Bones. The joints and the bones are often involved in tuberculous disease, especially those parts of the bones near the joints. Surgical treatment is required in many cases. When the disease is confined to the joints, the most essential point in the treatment is absolute rest for that joint. This is secured in various ways by the physician. (See chapter 48.)

Tuberculosis of the peritoneum (*tubercular peritonitis*) is a rather common form of the disease. The peritoneum is the lining membrane that covers the surface of the abdominal cavity. It is remarkable that patients often recover after a surgical operation in which all that is done is simply to open the abdominal cavity and afterwards let the wound close up. In women, tubercular peritonitis is in many instances associated with and seems to be caused by tuberculous disease in the Fallopian tubes. When this is the case, the diseased tubes must be removed.

Tuberculosis of the throat seldom occurs except in connection with tuberculosis of the lungs. Much can be done by treatment for the relief of this condition in connection with the treatment for the lungs.

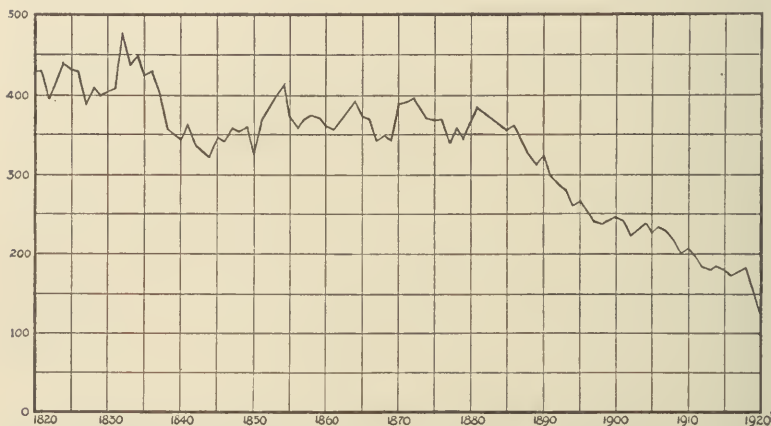
Tubercular meningitis is tuberculous inflammation of the delicate membranes that surround the brain. Very little can be done for it in the way of curative treatment. It is most likely to occur in children and young people, and is fatal within a few weeks.

Tuberculosis of the kidney is not a rare condition. (See chapter 58.) The earliest symptom is usually great disturbance of urination, which is painful and frequent. The disease is generally confined to one kidney, and its successful cure is often effected by surgical removal of the diseased organ. If both kidneys are diseased, of course this is impossible. In some cases, treatment with tuberculin apparently has had beneficial results.

¹ "Tuberculin" is the name applied to substances prepared from the bodies of the germs of tuberculosis (*tubercle bacilli*). This is accomplished by causing the germs to grow in large quantity in artificial culture, and afterwards killing them and extracting the material to be used.

Tuberculosis of the Lungs

Tuberculosis of the lungs is commonly called consumption. We cannot emphasize too strongly the terrible seriousness of this disease, in any consideration of health in the home. It is being gradually checked, but at a lamentably slow rate. What is needed is that the medical profession and the people at large should have more knowledge regarding the recognition of the disease when it appears and the right methods of treatment and management and the prevention of its spread. The great ma-



Graph showing the downward trend of the death rate from tuberculosis in the three great centers, New York, Philadelphia, and Boston, during the last 100 years.

majority of cases of consumption begin in persons from eighteen to thirty years of age, and many more deaths occur in the decade from twenty to thirty than at any other age. Some of the significant early symptoms are slight fever, loss of weight, poor appetite and digestion, rapid pulse, coughing, spitting of blood, bodily weakness, and nervousness. When any one or several of these symptoms appear, a dependable physician should be consulted, and a thorough examination required. A person who has these symptoms should not be easily satisfied with the assurance that he is all right. The hope of a cure in this disease depends on *early recognition* more than on anything else. In going to a physician, select a good one, one who is known in the community

as thorough and painstaking in his examinations, and one who has a well earned reputation for being honest with his patients.

Praetically all those tuberculosis patients who eventually make a complete recovery are among those who are reeognized as tubereulous and who begin energetie treatment in the earliest or ineipient stages. The sign upon which the physieian depends most in making his diagnosis is the presenee of tuberele bacilli in the sputum. This, of ourse, is determined by the mieroseope, but it is not absolutely neessary to find these in order to make a positive diagnosis. The physieian uses many methods in the examination, including the direct examination of the ehest and the help of the tuberculin test.

After the diagnosis is made, the important question is, What should be done to give the patient the best chance for full recovery? At this junecture, two dangers face the patient and the physieian. The first and greatest danger is that the physician will fail to impress adequately upon the patient's mind the gravity of the situation and the urgent neessity of a wise and thoroughgoing ourse. The patient must be told plainly of the danger facing him, so that it may not be minimized. On this account, the wise physician often feels that a very early but small hemorrhage from the lungs is a fortunate symptom, because it alarms the patient and sharply attracts his attention, and helps to make him willing to submit to treatment. However, from another standpoint, the oeeurrenee of early hemorrhages, as well as the presence of the tuberele baeilli in the sputum, is an unfortunate circumstance, as those eases in which there is no hemorrhage and those in which there are no germs in the sputum have a better prospeet for recovery. The other and lesser danger is that the patient may become too greatly alarmed and so dismayed as to refuse to take adequate treatment.

What shall be done to effect a cure? One of the most diffieult features of the whole problem of tubereulosis is the false idea which has been fostered in the minds not only of the people generally, but of a large part of the medieal profession, that the priniepal agency in the cure of pulmonary tuberculosis is the seecuring of favorable elimatie influenees. The first thought which comes to the mind of the patient and his friends and of his physieian is that he must "go west" to get well. In most eases, this is the worst thing that eould be done. Not that climate has no influence in the eare and eure of eonsumptives, but that its influence is unimportant as eompared with other matters that are all-important; and it almost invariably happens that in the act of moving, those other matters are neglected or preeluded.

The great factors in the cure of tuberculosis are rest, adequate food, and fresh air; and the greatest of these is REST.

All these remedies are, as a rule, available at the patient's home; and to the patient with the average financial resources, they become much less available when he moves to a new locality in unfamiliar surroundings, and becomes largely dependent upon strangers. This fact has been stressed by Dr. Lawrason Brown, of the Trudeau sanatorium at Saranac Lake, New York, in his book, "Rules for Recovery from Tuberculosis," by the assertions that "climate for the consumptives is a will-o'-the-wisp," and that to seek for recovery through climate "is like searching for the pot of gold at the end of the rainbow." It is bound to be a disappointment. One cannot help but suspect that in some cases, the physician advises change of climate because he has no hope that the patient will recover, and wants to get him off his hands.

It is true that some patients do better in one climate than in another, and not all cases of consumption are favorably affected by the same conditions; but the climatic influences are a minor consideration as compared with certain others. In general, it can be said that the climate which is best for the consumptive is the one in which he can most easily spend the greatest amount of time in the fresh air and sunshine without discomfort.

If the first thought for the newly discovered "lunger" should not be to ship him away to a Western climate, then what should it be? He must have treatment, and he must have it immediately. There are two rational courses between which we can choose. One is *home treatment* and the other is *institutional treatment*. Circumstances should determine the decision, and many circumstances should be weighed. Some features which must be considered in going away to a tuberculosis sanatorium are homesickness; unfamiliar surroundings; the financial support—can it be supplied by the family or some charitable or other organization? Will the patient be able to return to his home and live successfully in some other climate than that in which he has recovered? On the other hand, if treatment is to be taken at home, one must think of the possibility of providing a suitable room and surroundings, with the nursing and care that will be needed, and of securing expert and specially trained medical supervision and advice.

RELATION BETWEEN PHYSICIAN AND PATIENT

The physician must be competent, and must have had a real training in the care of tuberculosis patients. There must be mutual confidence on the part of the patient and the physician. When a patient consults a physician, the physician takes for

granted that the patient has confidence in him and comes for advice that he will follow. The patient must have sufficient confidence to follow to the letter the instructions given. In this case, medicine will not cure. The essential curative agency is the manner of life, which must be guided by the doctor. The patient must have sufficient confidence to tell all his thoughts and suspicions and observations about his own condition to the physician. The physician's confidence in his patient must be such that he will know that the advice and instruction which he gives will be carried out.

The story of one case will illustrate the point. A young woman between twenty and twenty-five years old developed symptoms of pulmonary tuberculosis. She had high fever, loss of appetite, coughing of sputum full of tubercle bacilli, and rapid loss of weight. A year or two before, a brother a few years older had manifested similar symptoms, and was soon compelled to go to bed, and in a few months died. When told that she was suffering of pulmonary tuberculosis, and that the only hope was for her to begin rest cure immediately by going to bed and lying perfectly quiet, she said she was not willing to do that, for she knew that going to bed meant giving up hope and that she would go just as her brother did. But two or three days later, she was persuaded to begin the treatment; and she immediately began to improve, and gradually recovered, after staying in bed most of the time for about twelve months.

In order for the patient to develop and maintain confidence in his physician, he must select one who is worthy of confidence. This certainly cannot include self-styled doctors who do not have a thorough education — first a general education, and then a real medical education. Persons who undertake to practice the healing art without having studied the elementary medical sciences, and then studied disease from a scientific standpoint, are not worthy of the confidence of the people. This will necessarily exclude all quacks or pretenders, and the adherents of the cheap cults or so-called schools of practice who make unwarranted claims, and follow irrational theories of disease and its cure.

If you have a sick animal, you with good reason employ a man to treat it who has had the best training obtainable, in the diseases of animals. If you have a valuable watch that needs repair, you take it to a workman who has had instruction and practice in the construction and repair of such delicate machinery. But there is a deplorable tendency to ignore reason when it comes to a question of sickness of ourselves or our friends. A considerable amount of superstition clings to us, and we are prone to grasp at a straw, and expect that some patent

medicine or old woman's remedy will in some mysterious way drive out a mysterious disease; or we trust to a self-trained horse doctor, who has turned quack, to have discovered some secret of healing which has escaped the attention of the combined study and experience of the well educated medical profession. Don't do it. Use common sense. Flee all "cures" and all pretentious healers.

If the physician and the family in a given case finally decide that the best course is to send the patient to another locality for treatment, it is of the utmost importance that arrangements be made beforehand for medical care by a competent physician in the new location, either a physician in a tuberculosis sanatorium, or one who is known to the home physician and recommended by him; and a letter to him from the home physician should be taken by the patient. If this is not done, most unfortunate mistakes are likely to be made, because such a patient is in great danger of taking the advice of some unscrupulous or unwise new-made friend, which will bring only sorrow and regret.

TUBERCULOSIS SANATORIUMS

Other things being equal, the institution for the care, the cure, and the education of tuberculous patients has many advantages. First, the patient is assured of expert care and methods. Second, he secures an education which is invaluable, in being taught how to take care of himself after leaving the institution. Some patients may be well enough to be discharged from the institution with the disease arrested in six months' time; but the cure is not completed, and at least three or four years more of home care and self care under the guidance of the physician is needed in the most favorable cases. Third, he learns the most approved methods of caring for his sputum and his person, so as to avoid infecting other persons in his home after he returns to it.

Patients do get well in sanatoriums. The Trudeau Sanatorium, the oldest and one of the best known in America, a few years ago made an investigation of all patients who could be traced, who had been in the institution, but had been discharged for twenty years or more. Of the 127 patients who had been admitted to the institution as "early" cases and later discharged, with the disease arrested or inactive, 71, or 56%, were still alive after twenty years.

Of 219 consumptives who had been admitted as moderately advanced cases and discharged as arrested or inactive after a period of treatment, 56, or 26%, were still alive after twenty years. No doubt many of the patients who had thus left the

institution had within the twenty years died of other causes than tuberculosis. These figures surely give reason for courage in the treatment of tuberculosis.

Patients who have recovered after a few months of treatment, are technically classified by the physician as "arrested." Some of these arrested cases will later relapse under adverse conditions, while many of them will remain well and be able to carry on the regular duties of life. Three or four years after such



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The Rest Hour in an Open-Air School for Tubercular Children

apparent cure, we are justified in speaking of them as "cured." Just which of the "arrested" cases will fall back and which will remain well after discharge from treatment cannot be foretold.

TREATMENT.

As already indicated, the three main features of rational treatment in pulmonary tuberculosis are rest, good food, and fresh air.

Rest. In every case, when the diagnosis is first made, the patient should be put to bed for six weeks, whether he is running a temperature or not. In those cases where fever is present, the period of rest in bed must be prolonged. If the patient has very high fever, the rest must be made as absolute as possible, including refraining from writing and reading; in some cases, he should be fed by the nurse. The length of time that this complete rest must be continued depends on how long the fever lasts.

After the fever subsides and there is no rise of temperature at any time during the twenty-four hours, the rest in bed must be continued for a month or longer, depending on the judgment of the physician. This period of rest after the fever ceases, is the time when the patient experiences the greatest benefit. After this, he is permitted to be up for a short time daily, and gradually to increase his activity.

The average patient feels that it is a great mistake to take this enforced rest. He thinks that if he goes to bed, he is giving up, and that if he stays in bed, he will necessarily grow weaker and die. This is a mistake. If a man has pneumonia or typhoid fever, he goes to bed and takes treatment, and in the greater number of cases, gets well. Tuberculosis is the same kind of disease, but differs in that it runs a longer course — is a chronic disease; and it calls for the same rest in bed. The fact is that the weakened tuberculosis patient actually gains strength and weight while resting in bed. *Rest* is never dangerous. *Exercise* in these cases is always dangerous and often fatal. Dr. Lawrason Brown says that "exercise is a dangerous medicine," and that "more patients fail to recover from failure to appreciate the danger that lurks even in gentle exercise than from any other cause." The story is told of one man who had consumption and was cured as a result of having a leg broken. The compulsory rest while the bone was healing gave the needed opportunity to recover from his tuberculosis.

In the less serious cases, the patient can return to his duties and take up more or less active work after six months or more. This is the critical stage in his cure. He is now thrown on his own judgment to a large degree in deciding how much bodily exertion he can stand. A patient must learn self-control. Unless he has done this while under treatment, his training is a failure. The arrested case should remain in bed longer at night than the ordinary person.

Food. Enough nutritious food must be taken to maintain the patient's strength and at the same time increase his weight. After he recovers his normal weight, it is unwise to continue a stuffing process. Much harm can be done by overeating. Experience has shown that milk and eggs are an excellent diet for a tuberculous patient. These, of course, should be taken in conjunction with other articles of food. It is sometimes found advisable for the physician to prescribe dilute hydrochloric acid to assist the stomach in the digestion of the nitrogenous food. In many cases, where the stomach is badly disordered and the appetite is poor or lacking, all food may well be given in liquid form. (See chapter 22.)

Alcohol as a remedy, a stimulant, or a food should be entirely avoided. A tuberculous patient will be better off if he does not use tobacco. If he has been in the habit of using it, this habit should be broken.

Fresh Air. Life in the open air, including the rest cure in the open air, is unquestionably of great benefit in the treatment.



A Fresh-Air Porch

If the cure can be taken in a climate where practically the entire time can be spent out of doors, so much the better. If the climate is less favorable, approximately one half the time, at least, should be spent out of doors. Under these circumstances, the best plan is to have a porch fitted up for the patient, on the sunny side of the house, and protected from strong winds. His bed, or the rest cure chair in which he reclines, should be upon the porch during the daytime, and he can sleep at night in his room. If the doorway can be so arranged that the bed with the patient in it can be wheeled to the porch in the daytime and into the room at night, this is a very desirable arrangement. Where the high fever is not present, which demands lying flat in bed, a partially reclining posture is more comfortable and just as satisfactory. This can be secured by arranging mattress and pillows to suit, or by the use of a reclining chair, such as is made for this particular purpose. The patient's body should recline at an angle of about thirty degrees from the horizontal.

The room occupied by the patient should have good ventilation, night and day. This means that there should be at least two openings, as two windows or a window and a door, on opposite sides of the room, and that they must be kept open constantly. Specially constructed tents, as well as various types of window tents, may be used to good advantage. Much valuable information regarding equipment and other related details may be obtained by writing to the National Tuberculosis Association, 381 Fourth Avenue, New York. This association also publishes the *Journal of the Outdoor Life*, which is devoted to matters of interest along these lines.

It is known that those climates in which there is a decided variation of temperature are most favorable, and especially a climate in which there is a variation of at least twenty degrees between the day and the night temperature. This variation serves as a stimulating influence, which seems to be of definite value. These daily variations of temperature are characteristic of the semiarid regions of the great Southwest. The daily use of a sponge bath with cool or cold water, at least to the upper part of the body, serves a useful purpose, doubtless for the same reason. When the patient is at rest, this should be administered



A Window Tent

by the attendant. These baths should always be taken in a warm room.

The Treatment of Symptoms: Some of the distressing symptoms that require attention are fever, night sweats, coughing, loss of appetite, and vomiting from coughing after meals. Except in the advanced cases of consumption, where there is little or no hope for permanent improvement, these symptoms usually disappear rapidly as the result of the rest and fresh air treatment, so that very little attention need be paid to them. Antipyretics or other drugs are very rarely needed to relieve fever in tuberculosis. Where it seems necessary, physicians sometimes prescribe certain drugs for exhausting sweating at night; but as a rule, this is controlled by the outdoor treatment. It is very important to control, if possible, severe attacks of coughing, particularly what are called dry coughs or unproductive coughs. A certain amount of coughing may be required to clear the lungs of accumulated material which makes up the sputum. The hard, racking coughs are the source of great damage to the patient, completely neutralizing the effect of the rest cure. A hard spasm of coughing is as exhausting as severe labor. Some exciting causes of cough are chilling, dust, exertion (as walking and talking), and smoking. Some of the simple means of controlling the cough are sips of cold water, cold water with a little lemon juice or orange juice, the taking of slow, full breaths, holding the breath, and the influence of the will. It is often well to take a cup of hot milk or other hot drink, the first thing in the morning, to stimulate the expulsion of the accumulated sputum from the bronchial tubes.

The tendency to vomit after eating may be lessened by clearing the bronchial tubes by the method mentioned above, just before eating. Another precaution is to drink freely of fluid, about an hour before mealtime, and to take the meal in a concentrated, dry form. Lying quietly for an hour or more after eating also helps. To prevent coughing at night, a moist chest pack may be worn. (See chapter 10.)

DON'T GET TUBERCULOSIS YOURSELF

Keep as well as you can; for the healthier your body, the harder for the germs of tuberculosis to grow therein. To keep healthy, observe the following rules:

Don't live, study, or sleep in rooms where there is no fresh air. Fresh air and sunlight kill the tubercle bacilli, and germs causing other diseases. Therefore have as much of both in your room as practicable.

Don't live in dusty air. Keep your rooms clean. Get rid of dust by cleaning with damp cloths and mops. Don't sweep with a dry broom.

Keep at least one window open in your bedroom at night, and air the room two or three times a day.

Don't eat with soiled hands. Wash them first.

Don't put your hands, pencils, or any candy or chewing gum that other persons have used, in your mouth.

Don't keep soiled handkerchiefs in your pockets.

Take a warm bath with soap at least once a week.

Don't neglect a cold or a cough, but go to a doctor or a dispensary.

HOW TO GET WELL IF YOU HAVE TUBERCULOSIS

If you or anyone in your family have tuberculosis, you must obey the following rules if you wish to get well:

Don't waste your money on patent medicines or advertised consumption cures, but go to a doctor or a dispensary. If you go in time, you can be cured; if you wait, it may be too late.

Don't drink whisky or other forms of liquor.

Don't sleep in the same bed with anyone else, nor in the same room, if you can avoid doing so.

Good food, fresh air, and rest are the best cures. Keep out in the fresh air and in the sunlight as much as possible.

Keep your windows open winter and summer, day and night.

If properly wrapped up, you will not catch cold.

Go to a sanatorium if you can, and before it is too late.

A person who has pulmonary tuberculosis or consumption is not dangerous to those with whom he lives and works, if he is careful and clean.

DON'T GIVE TUBERCULOSIS TO OTHERS

Many grown people and children have pulmonary tuberculosis, or consumption, without knowing it, and can give it to others. Therefore every person, even if healthy, should observe the following rules:

Don't swallow your expectoration; but —

Don't spit on sidewalks, playgrounds, or floors. It spreads disease, and is dangerous, indecent, and against the law.

When you must spit, spit in the gutters or into a spittoon half filled with water.

Don't cough or sneeze without holding a handkerchief or your hand over your mouth or nose.

CHAPTER 48

Diseases of the Joints

The chief structures we think of in relation to diseases and injuries of movable joints are:

1. The two or more bones that form the joint.
2. The ligaments that hold these together, preventing motion beyond normal limits.
3. The cartilages that cover the bony surfaces where they touch each other.
4. The synovial membrane that lines the inner surface of the ligaments surrounding the joint. This secretes a fluid that lubricates the joint, and we may think of it as a tube connected at its open ends to the edges of the articular cartilages.
5. We also have, about many joints, as the knee, the hip, the shoulder, and the elbow, small water bags or pads lined with synovial membrane and filled with synovial fluid. These are called *bursæ*, and serve to protect underlying or overlying tissues from friction or from being bruised.

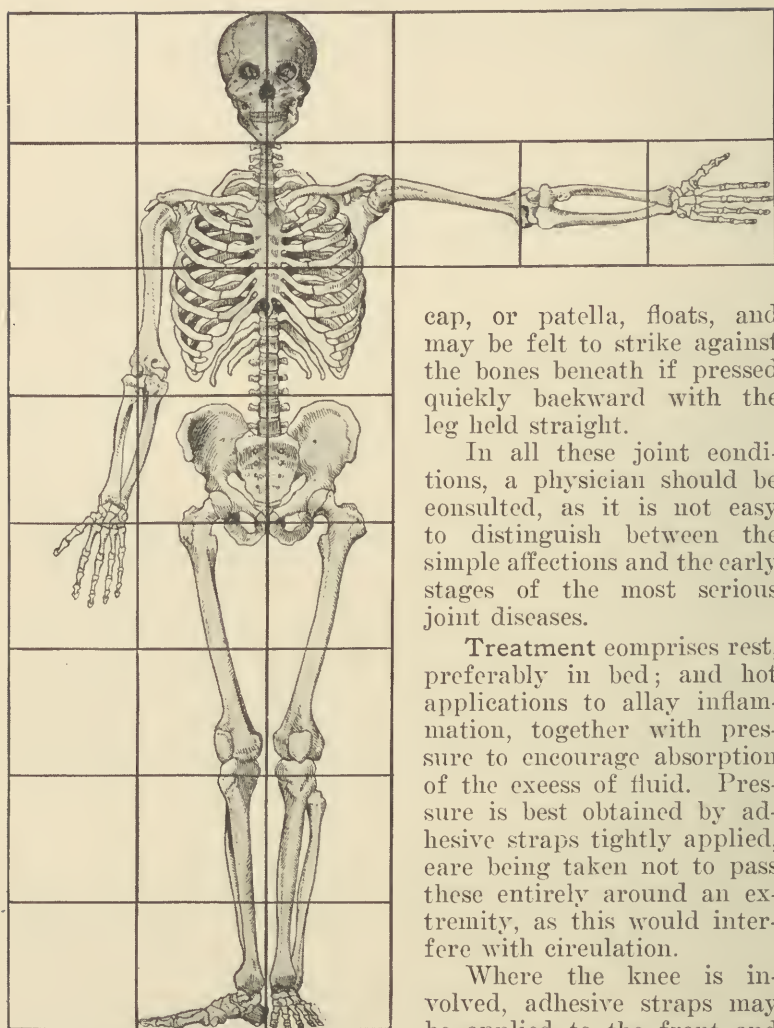
One of these *bursæ* is found in front of the kneecap, and protects the bony and the soft tissues in this region from injury during kneeling.

The more important diseases and affections involving joints and their neighboring structures are: synovitis; sprains; bursitis; arthritis, which term means an inflammation involving, more or less, all the structures of a joint, and of which there are several forms.

SYNOVITIS

Synovitis is an inflammation of the synovial membrane lining the joint cavity; and since the function of this membrane is to secrete a lubricating fluid, irritation or injury produces an excessive secretion, which causes distention and swelling, also pain and limitation of motion, of the joint affected.

Causes: Simple acute synovitis is most commonly due to injury associated with sprain of the joint involved. The knee joint is oftenest affected; and if much fluid is present, the knee-



The Human Skeleton

cap, or patella, floats, and may be felt to strike against the bones beneath if pressed quickly backward with the leg held straight.

In all these joint conditions, a physician should be consulted, as it is not easy to distinguish between the simple affections and the early stages of the most serious joint diseases.

Treatment comprises rest, preferably in bed; and hot applications to allay inflammation, together with pressure to encourage absorption of the excess of fluid. Pressure is best obtained by adhesive straps tightly applied, care being taken not to pass these entirely around an extremity, as this would interfere with circulation.

Where the knee is involved, adhesive straps may be applied to the front and sides of the joint, beginning three or four inches above the

kneecap, and extending the same distance below it. Or the leg and the thigh may be placed on a well padded board splint, with a pad of felt containing a hole for the patella placed over the knee and held in place by an ordinary bandage applied firmly from the ankle to the upper thigh.

SPRAINS

Causes: Sprains are injuries caused by wrenching, twisting, or forcibly bending a joint beyond its normal limit of motion, resulting in a stretching or tearing of the ligaments, with injury of the synovial membrane. Rupture of the small blood vessels causes ecchymosis (a black and blue appearance). There is excessive accumulation of fluid within the joint, and the neighboring soft tissues are inflamed and swollen.

Treatment: The first indication of treatment is to increase the blood supply so as to favor the carrying off of the products of injury. To do this, the part may be placed in hot water, or hot applications may be made. If heat is not available, cold may be at once applied, and continued only long enough at one time to produce redness. Later, heat and local rest, with occasional massage and gentle passive motion, are indicated.

A joint is rested by fixation, partial or complete, to limit its motion. This may be accomplished by bandaging, strapping, or application of a plaster of Paris cast. Complete and prolonged fixation is contraindicated in cases of sprain, as it prolongs the period of recovery.

In case of a suspected sprain, it is especially important to consult a physician, as it is not easy to be sure that there is not a broken bone. The use of X rays is very helpful in making certain as to the possible existence of a fractured bone.

BURSITIS

This is the inflammation of some of the protecting water sacs or pads about a joint. It is associated with an increase of the amount of fluid in the bursa, and with pain and more or less limited motion in the neighboring joint. It may be mistaken for synovitis or arthritis. Occasionally the fluid within the sac may become purulent, so that pus is present instead of synovial fluid. In this case, all symptoms will be more severe, and the patient will have a slight fever and associated constitutional symptoms.

Treatment: Simple bursitis is treated similarly to synovitis; but where pus is present, it should be lanced and drained. This, of course, should be done by a physician.

TUBERCULOUS ARTHRITIS

This is a tuberculous disease of joints, usually involving but one joint at a time, although occasionally more than one is affected.

Tuberculosis of the hip joint has also been called hip joint disease. Tuberculous disease of the knee, the elbow, the ankle, or the wrist has been called white swelling. Tuberculosis of one

or more of the bodies of the vertebræ, or segments of the spinal column, is frequently called Pott's disease.

Any movable joint may be affected with tuberculosis. In tuberculous joints, the disease begins in one of the bones, at a point near the articular cartilage. If the process develops unchecked, the cartilage is destroyed in whole or in part, and all of the joint structures are involved, with subsequent destruction of large areas of bone, which often results in complete dislocation of the bones of the joint. It is possible, however, especially with proper treatment, for the active process to be arrested at any stage, even before the joint cartilages are involved. But as a rule, the activity continues until there is more or less destruction of the joint; and a cure at this stage results in a stiff joint by a fibrous or bony union of the joint surfaces. In an untreated or improperly treated disease of the hip joint, there is frequently a dislocation of the head of the bone out of its socket. These cases will not show complete stiffness of the joint, but there will be marked shortening, with a drawing in and forward of the limb.

Symptoms: The symptoms of tuberculous disease of bone are systemic and local.

The systemic symptoms are the same as in any other form of tuberculosis—loss of appetite, weight, and strength, anæmia, and daily rise of temperature.

The local symptoms, common to all, are pain upon pressure and motion of the affected parts, with swelling or thickening of the tissues of the joint. The pain is often of such nature as to cause the patient to cry out at night. There is also muscle spasm, or rigidity of the muscles controlling the joint, causing a limitation of motion in all directions. This muscle spasm accounts for the stiffness in the early stage; while in the late stage, the stiffness is due to union of the bones of the joint. There may be abscess formation at any stage of the process, and these abscesses occasionally open through the skin. This should be prevented, if possible, as tuberculous abscesses do not demand open drainage, as do abscesses caused by pus-producing germs.

Treatment: Details of the treatment vary according to the joint involved. The chief thing to be accomplished in all cases is to put the joint in a condition of complete rest, so that no motion is possible; and usually it is best, in the earlier stages of the treatment, to have the joint surfaces pulled apart from each other by some method of traction. Various combinations of special beds, plaster of Paris casts, and splints are used for these purposes. All must be managed, of course, by a well trained physician. The most important thing to be said in this connec-

tion is to sound a warning against delay in securing medical attention for any lameness in a hip in a child, or a pain that seems to be in the knee, but is actually, in many cases, caused by hip disease. Early thorough treatment will often secure complete cure. Delay may mean complete destruction of the hip, or final loss of life.

If an elbow or a knee joint is affected, it should be placed in a plaster of Paris cast, the knee being held fully extended, and the elbow flexed to approximately a right angle, as these are the most favorable positions in case of permanent stiffness.

If the shoulder joint is affected, a splint is used that will hold the arm fixed at an angle of about 50° outward from the body. In case of tuberculosis of the spine (Pott's disease), the patient is best placed in a reclining position, either on a Bradford frame or in a plaster of Paris shell made to fit the back and to permit of gradual hyperextension, or backward bending, of the spine opposite the region of the disease. This will take pressure off the diseased bodies, or the segments of the spine. Otherwise these would be crushed, allowing the spinal column to bend acutely forward with a sharp angulation backward, which constitutes the hump of the back which is very pronounced in untreated cases.

These patients are often kept on their backs for one or two years. Then later they are allowed to be on their feet in plaster of Paris jackets, so applied as to arch the spine backward. This is continued for a year or more. Later, to prevent increase of deformity, they are fitted with a metal brace, which it may be necessary for them always to wear.

Of late, these cases are occasionally operated on, a bone graft taken from the patient's shin being placed in a groove formed by splitting the spinous processes of the vertebræ. When this graft has grown in position, it prevents, or greatly limits, motion in this region of the spine; and since fixation is the treatment for tuberculous joints, this operation, if successful, should help to cure the tuberculous disease of the bodies of the vertebræ, also to act as a permanent splint or support.

Any case presenting symptoms at all suggestive of joint or spinal tuberculosis should be placed under the observation of a physician as early as possible, for early treatment usually means an early arrest of the destructive process.

ACUTE ARTHRITIS

For a long time, "rheumatic fever" (acute rheumatism) was the name applied to any acute inflammation of a joint which was not produced by injury or gout; but gradually the term

"acute articular rheumatism" has come to be limited to joint affections that often are associated with tonsillitis, decayed stumps of teeth, decay beneath an apparently good filling, pus centers at roots of teeth, infection in nasal sinus or mastoid cells, or infection in the intestinal tract. The old theory that rheumatism was caused by an accumulation of uric acid in the system has been exploded. Rheumatism has been definitely proved to be due to an infection.

The uric acid that is nearly always present in acute rheumatism results from faulty proteid metabolism (inability of the body to take proper care of the proteid food taken into the body). This is why all physicians advise patients to eat less meat during such an attack.

The disease is commonest among young adults, and males are oftener affected than females. Infants seldom have this ailment. A tendency to rheumatism has been thought to be inherited, but this has not been proved. One attack leaves an individual more liable to a second attack. Certain occupations undoubtedly lower the vital resistance, and thus render persons more prone to the disease; for example, work that compels one to undergo exposure to wet and cold.

Symptoms: The disease usually begins abruptly; but in some cases, the patient has previous warnings in the form of irregular pains in joints and other parts of the body. The fever rises quickly; and with it, one or more joints become swollen and very painful. There is usually loss of appetite, marked thirst, profuse acid perspiration of a peculiar sour odor, and in most cases, constipation. The urine is scanty and strongly acid. The affected joints are painful to move, hot to the touch, and present a reddish appearance. There is a decided tendency of the inflammation to subside in one joint and develop in another. The knee, the ankle, the elbow, and the wrist are the joints usually in turn attacked.

Treatment: An X ray of the teeth should be made, and all diseased teeth should be extracted. Diseased tonsils should be removed by surgical operation. All infected cavities in the nose or mastoid cells should be drained. The intestinal tract should be freed from any infection. The patient should wear flannel gowns at night to protect him from the cold. Many advise sleeping between blankets for the same purpose. The food should be liquid, given at regular intervals, until the temperature subsides; then a more liberal diet may be given. Flesh foods should be avoided. The patient should be encouraged to eat freely of fruit.

Hot applications in the form of hot blanket packs are of service. (Chapter 10.) The patient may be kept in the pack

several hours, and this treatment may be repeated with benefit. Hot air (in the form of baking), radiant heat, local electric light baths, Turkish and Russian baths, are given with good results.

Local fomentations usually give the best results, because more easily given and less exhausting to the patient. All general



Bones of the hand (right) in a case of arthritis deformans of five years' duration, as compared with the bones of a normal hand (left). Note the "welding together" of the bones in some of the finger joints, and the irregular density of the bones.

cold treatment should be avoided, such as cold sprays and cold baths. The wearing of a heating compress over the affected parts at night may give relief. (See chapter 10.) It keeps the patient free from pain during the night, and helps to reduce the swelling. The use of the galvanic current is also beneficial in relieving the pain.

These cases should be under direct supervision of a physician, as complications, such as inflammations of nervous structures of the heart, may occur during the course of the disease.

ARTHRITIS DEFORMANS

This is one of the most ancient of diseases. Its principal effect is noticed in the cartilages that cover the articulating surfaces of the ends of the bones. This cartilage becomes soft, and is either absorbed, or gradually thinned by pressure, thus leaving the ends of the bones bare which rub against each other, and



Bones of the foot (right) in a patient with arthritis deformans of five years' duration, as compared with the bones of a normal foot (left). Note the "eating away" of the bones at the joint ends, and the dislocation of the metacarpal bone at the base of the great toe.

producing more or less irritation and inflammation. At the margin of the joint, where the pressure is less, the cartilage grows in irregular nodes (tumorlike masses), which soon turn to bone, thus making the joint much larger, and finally it becomes permanently stiff. In some joints, the ends of the bones become soft, and wear away rapidly, thus shortening the limb.

The cause of this disease is not definitely known. It may be the result of a focal infection. The bones most commonly affected are those in the fingers, especially at the ends of the fingers; and there is a marked deformity as a result of the enlargement of the joints.

Another form of the disease affects the joints in the spinal column. It may at first simply cause pain and a weak back; but as the disease progresses, it may cause a complete rigidity of the spine and the ribs. The muscles attached to these bones,

not being able to carry on their regular work, become smaller and weaker, and progressive wasting takes place.

Treatment: Seek the services of a physician who is competent to search for a possible focus of infection. Any treatment, when the disease is once well established, is oftentimes of little value. Hence the necessity for early treatment. In the beginning, massage carefully given, hot fomentations, hot air, and local electric light baths may not only check the progress of the disease, but be the means of overcoming some of the rigidity of the joints, and prevent the atrophy of the muscles.

Fresh air, plenty of sunshine, and sanitary surroundings are most important. As these patients generally are poorly nourished, a liberal diet is considered essential.

Medicinal remedies have not been of any benefit. The disease may be arrested after attacking only a few of the joints in the hands; but often it continues to attack other joints, causing great deformities and rendering the hands almost useless.

GONORRHEAL ARTHRITIS (GONORRHEAL RHEUMATISM)

Causes: Gonorrheal rheumatism is an inflammation of a joint, caused by the presence of gonococci. They are carried there from the original focus of infection, which is usually in the urethra. This condition may develop after any case of gonorrhea, appearing several weeks after the infection. It usually involves only one joint, oftenest the knee; but other joints may be affected. In mild cases, the joints become swollen, and there is discomfort and weakness and stiffness in use. In severe cases, the skin becomes hot, sensitive to touch, and glazed. There is intense pain on motion or slightest jar. After the subsidence of the acute symptoms, the thickening persists, and permanent stiffness (ankylosis) may result.

Treatment: Treat the original gonorrheal infection. (See chapter 71.) To restore functional activity to the joint, hot fomentations, hot air, massage, the hot and cold douche, and static electricity are of service in stimulating circulation. Galvanic electricity helps to relieve the pain. An ice bag applied over the knee will often relieve pain and tenderness.

If the limb has become deformed, and is fixed by adhesions and contractions, the deformity may be corrected to a greater or less degree by forcible manipulations under anæsthesia. Use of the limb is the most effective restorative treatment after the acute symptoms have subsided.

In this disease, as in all cases of gonorrheal infection, a physician should have full supervision of treatment.

BUNIONS

A bunion is a painful enlargement of the tissues at the inner side of the joint at the base of the great toe. It consists of an exostosis, or irregular growth of the bones entering into the formation of this joint, with thickening of the skin and other overlying soft tissues. The joint is made to appear still more prominent by an outward bending of the great toe, a condition known as hallux valgus, which is practically always associated with bunions, and is in fact part of the same pathological process.

The cause of the condition can be traced directly to the wearing of too narrow, too short, or too pointed shoes.

The narrow shoe subjects this joint to increased pressure and friction during walking, and the short or pointed shoe does the same thing by bending the end of the great toe outward, which makes the joint more prominent and subject to pressure irritation.

This produces a mild irritation of the injured structures, which stimulates overgrowth of all tissues involved,—the skin, the bone, and an intervening bursa.

The longer this irritation continues, the greater will be the deformity. In severe cases, the great toe is practically dislocated in its relation to the corresponding bone of the foot.

Treatment: The cause should be removed at once. The patient should wear shoes that are not pointed at the toes. Those are best which have the inner border of the shoes straight. Rest and hot applications give relief in mild cases. Afterwards the callus may be removed and the sensitive part be protected by a bunion plaster. A surgical operation is necessary when these other methods fail, and in all well advanced cases, but should not be performed until the acute symptoms subside.

Affections of Bones, Muscles, and Tendons

ACUTE OSTEOMYELITIS

This is a destructive inflammation of bone tissue and bone marrow caused by infection with disease-producing bacteria.

It is essentially a disease of childhood and early life, usually between twelve and seventeen years of age, and is principally a disease of the long bones of the body and of the bone marrow.

The disease is due to an infection, and may be traced to diseased tonsils, boils, carbuncles, and similar infections. It may affect several bones at the same time, although usually confined to one bone. In many cases, an injury may immediately precede the onset of the process.

Symptoms: The symptoms are chill, high fever, rapid heart, local pain, and marked pain on pressure over the part of the bone affected. Often a considerable mass of bone dies; and this dead bone will keep up a chronic pus formation, which will continue indefinitely unless an operation is performed.

Treatment: In suspected cases, a physician should be called at once. The treatment consists in immediate free opening of the bone at the suspected point, to relieve the tension and to establish free drainage. Thorough drainage is established by the use of tubes of rubber surrounded by a loose packing of gauze.

The outcome in neglected cases is bad. The limb should be put in a splint, to keep the leg quiet and immobile. Daily dressing of the wound is necessary. As soon as fever, pain, and swelling subside, passive motion should be started, to prevent permanent stiffness.

After several weeks, it is usually necessary to operate again on these cases, in order to remove devitalized bone that is responsible for a persistence of the discharge. In some instances, large portions of the shafts of the large bones must be removed. This bone is generally



An Osteomyelitis, or
Inflammation of Bone
Tissue and Bone
Marrow

replaced by new bone; but if not, subsequent operations, such as bone grafting, must be performed to replace the destroyed bone.

SPINAL CURVATURE

The spine is practically straight at birth. Spinal curvatures are more common among women than among men, for the reason that young men are more athletic and more inclined to engage in exercise that tends to strengthen the muscles of the back. One of the chief causes of lateral curvature of the spine is lack of exercise in growing children, combined with sitting long hours in schoolrooms and other places of meeting, in improper positions, and standing and lying in improper attitudes; also certain occupations that compel one to work in an abnormal position, if these are followed for a long period of time, especially by the young, whose bones are soft and more easily shaped to fit the position.

Among school children, the use of too low or too high seats is in many instances responsible for deformity of the spine. The practice of bookkeepers and students of standing in one position, with the same arm always elevated on the desk, will often produce a lateral curvature of the spine.

The Romans many centuries ago discovered that their slaves who were employed in rowing, if kept always on the same side of the ship, developed lateral curvature of the spine. To prevent this, they were frequently changed from one side of the boat to the other.

The effect of all these faulty positions, if not corrected, is to produce a permanent deformity of the back; and as a frequent result, the abdominal organs are pushed out of their normal position, and their function markedly disturbed, thus producing a variety of symptoms.

Prevention: This includes the avoidance of all the predisposing or exciting causes of weakness as well as deformity. The first and most important preventive measure is the discovery of the deformity, or of the tendency to deformity, at an early stage of its development, when it may be checked or cured. The only way to discover such conditions is to look for them. The regular inspection of the bodies of children by the family physician is a splendid practice. The provision of proper desks and seats at school is very essential. The seat for the child at school should be of such height as to allow the feet to rest firmly on the floor, and should be inclined slightly backward. The back of the seat should extend to about the level of the shoulders, and it also should be inclined slightly backward. The desk should be close enough to the body, that the child need not lean forward when

reading or writing. The height of the desk should be slightly less than the level of the elbows when the child sits erect, and the inclination should be sufficient to hold the book at the proper distance from the eyes.

The vertical handwriting is of advantage in that the children are taught to face the desk squarely, as contrasted with the lateral twist of the body—the usual attitude in writing.

Treatment: For purposes of classification and treatment, cases of lateral curvature of the spine are divided into two groups, according to the type of deformity. Cases in which the curvature disappears when the patient is reclining, and which evidently are not caused by any alteration in shape of segments of the spinal column, are called functional, postural, or habitual scoliosis.

Cases in which the deformity persists regardless of the position of the patient, and which are associated with changes in the shape and structure of some of the vertebræ, are termed structural scoliosis.

The treatment of the forms of the more simple type consists in carefully supervised series of exercises that have as their object the development of weakened groups of muscles so as to enable them to hold the bent or curved spinal column easily in a correct or overcorrected position until a correct posture becomes habitual.

The treatment of structural scoliosis is much more difficult, and this type is probably never entirely cured. Besides using exercises to develop muscles and to bend the spine forcibly in the direction of overcorrection, the patient must wear a plaster of Paris jacket for a long period of time. This jacket is applied while the patient is held forcibly bent in a direction opposite to the deformity, in a specially devised frame.

In the most severe of these cases, after all the correction possible has been gained, a retaining brace, or corset, is made, and worn more or less constantly except when the patient is in a reclining position.

Series of exercises for the benefit of these cases have been devised by a number of orthopedic men. Those devised by Teschner are to be performed before a mirror, the patient being clad in a close-fitting bathing suit, so that the positions may be constantly observed by the patient and by the instructor. During the performance of the exercise, the patient holds himself in the best possible position. Space will not permit a detailed description of exercises and movements used.

In all cases, the physician should make careful measurements of the two legs, to detect, and to correct by changes in the shoes, any difference in length.

ROUND SHOULDERS

This is one of the most common deformities, and is largely due to habit,—bad positions in the school, in the home, in the factory, and on the farm. In children, it may be induced by obstructions in the respiratory passages, such as enlarged tonsils or adenoids, or by bronchitis or heart disease. Another predisposing cause is clothing that prevents the child from fully expanding the chest and extending the arms. In some cases, even the weight of the clothing may be a factor in bringing on the trouble. Certain types seen in both young men and young women are caused by overwork, or work where the body cannot be kept in an erect position.

Treatment: Even slight posterior curvature of the spine checks the expansion of the chest and disturbs the balance of the body. It may be a predisposing factor to tuberculosis.

The X ray shows that the abdominal organs can be raised from three to six inches by muscular effort in the erect position. The maintenance of the erect position from childhood to old age is of the greatest benefit. The position held by the young soldier in military drill—head erect, chin depressed, shoulders thrown back, chest expanded, and the abdomen drawn in—should be encouraged. Clothing should not restrict the movements of the arms and the chest.

In certain extreme cases, spinal braces may be worn. Ordinary shoulder braces do no real good. Proper exercise is the best remedy to overcome the difficulty.

A simple treatment is to place the arms on the sides of an open door and allow the body to lean as far forward as the muscles of the back will permit. The use of the elastic cords (Whitley exercisers) is of great benefit. Special gymnastics should be tried.

The so-called “setting up” exercises used in army training are helpful in maintaining a good posture and a straight spine, as well as in correcting round shoulders. These should be practiced daily.

WRYNECK

Wryneck is a twisted neck, a distortion caused, in most instances, by contraction or shortening of one or more of the muscles on the side of the neck which control the position of the head. This condition may be congenital. It may be very slight when the child is born, and not be noticed until the child supports its head or even walks. In rare cases, the deformity even in infancy may be very marked, and may be accompanied by deformity of face and skull. In well developed cases of long

standing, the face on the affected side is shorter and flatter; the nose, the corner of the mouth, and even the eyelids are drawn downward; and the skull shows evidence of being misshapen. A case that is slight in infancy may develop with the growth of the child. This fact emphasizes the importance of treatment as soon as possible after the condition is discovered.

Almost all cases of wryneck are of the regular type, that is, the head is tilted toward the shortened muscles, while the chin is rotated in the opposite direction. Efforts to straighten the head are painful. Movement of the head is easily performed when the muscles on the affected side are relaxed.

Treatment: Congenital wryneck is sometimes overcome by methodical stretching of the contracted muscles. One person fixes the arms, and another draws the head gently but firmly in the direction opposite to the contraction, over and over again, at the same time massaging the tissues of the neck. This should be done several times each day. It may cause some discomfort, but this subsides as soon as the stretching is discontinued.

When the child is held in the mother's arms, and when it is asleep, care should be used to prevent improper position. In this way, wryneck of the milder types may be entirely corrected, or its progress checked until more effective treatment can be given.

Good results have been obtained in more advanced cases by systematic kneading and stretching of the muscles by physicians until resistance is overcome, a plaster of Paris bandage, or other support, then being applied to head, neck, and chest, with the head in an overcorrected position. (This must be done by a physician.) The support should remain from four to eight weeks, until all local sensitiveness has disappeared and the tendency toward deformity has been checked.

When the bandage is removed, massage and gymnastic exercises are necessary. Several times each day, the head should be forced to the extreme limit of overcorrection. If there is a tendency for the head to return to its former attitude, some support should be worn for a longer time, the massage and other exercises being kept up still.

The usual method of handling typical and well developed cases of wryneck is division, under anaesthesia, of the contracted muscle or muscles of the neck, and retention of the head in an overcorrected position by some form of brace until the tendency to deformity is overcome. In all cases showing an unusual position of the head, a physician should be consulted early, as secondary changes in the features are certain to occur unless the primary deformity is corrected.

FLAT FOOT

The function of the foot is twofold; namely, that of a passive support to the weight of the body, and that of an active lever to raise and propel it. For the proper performance of these functions, it is constructed to permit elasticity under pressure and strain, which protects it from injury and prevents jarring.

The most noticeable peculiarity of the foot is the arrangement of its arches. These arches act as springs, or shock absorbers, like those of an automobile, and may be demonstrated by making an imprint of the foot in moist earth or plaster of Paris. The plaster cast that represents it, will show a pronounced curve, with convexity upward. When the weight is borne, this curved contour of the foot straightens, the same as a long steel spring when weight is brought on it.

The arches are supported by muscles, ligaments, and by a strong plantar fascia that covers the sole. When the foot is actively used, it is in great part supported by the muscles; but when it serves as a passive support, as in standing, the ligaments bear the greater part of the strain, and its normal elasticity allows the bearing surface to expand as the arches are slightly depressed.



Left: Print of a normal foot.
Right: Print of a flat foot.

Causes: Flat foot, or the loss of the normal arches of the feet, is caused by anything that will weaken or unduly strain the muscles that normally support the arches, or that will rapidly increase the weight those arches must support, without allowing sufficient time for the muscles that control the arches to develop proportionately.

When the muscles can no longer support these arches, the strain falls on the ligaments, which soon stretch, allowing a flattening out of the arches that is apparent even when the foot is at rest.

In flat foot, the feet no longer are used as levers to propel the body in walking, nor is there spring or elasticity to the step; but they are used as mere pedestals in walking, the weight resting mainly on the back part of the foot.

Any muscle that is not used, or but little used, atrophies, or becomes less able to perform its function. So if a person is confined to bed, or walks but little, the muscles involved in walking become weaker. If such a person begins more or less violent exertion suddenly, the muscles refuse to support the

arches of the foot, and he begins using the foot as a mere pedestal instead of using it as a lever. This places the strain on the ligaments. These stretch and the foot flattens.

The same process may occur from rapid increase in weight without proportionate increased muscle strength. It may occur from general weakness, or from an occupation that requires the patient to carry heavy weights, or to remain long hours on the feet in a more or less passive attitude, without sufficient walking or leverage action of the foot to keep up the tone of the musculature.

Flat foot and its accompanying deformity are found in every grade of severity. Discomfort usually begins when the strain upon the muscles is disproportionate to their strength, and it is increased when the ligaments begin to give way under strain, allowing the bones to occupy an abnormal relation to one another. The early symptoms are caused by fatigue and strain of the muscles working at a disadvantage; and the later symptoms are explained by the injury to which the overstrain has subjected the mechanism of the foot.

Weak feet, which are very common in childhood, do not, as a rule, cause disability until the age of fifteen to twenty, when the weight and strain put upon them is increased.

Symptoms: A sensation of weakness, a feeling of discomfort, of tire and strain, about the inner side of the foot and ankle; sometimes, after long standing, a dull ache in the calf of the leg, or pain in the knee, the hip, or the back. The symptoms are more common in women than in men. Often, after over-exertion, a sharp pain is noticed, radiating from the point of weakness. The feet have lost their elasticity. The patient may complain that he cannot buy comfortable shoes. The reason is that the weak foot is changed in shape under use, so that the shoe that is comfortable in the morning compresses the foot painfully at night. Thus increasing discomfort from corns, bunions, enlarged great toe joints, and other deformities of the toes develops. Coldness, numbness, congestion, and increased perspiration, caused by weakness and impaired circulation, are common symptoms in this class of cases. Actual pain is, as a rule, felt only when the foot is in use.

Treatment: The principles of the treatment that leads to the permanent cure of a weak and deformed foot, are very simple, but the application varies somewhat according to the grade and duration of the deformity.

The object of treatment is to change the weak foot so that it may conform to the normal foot not only in shape, but also in

standing position and strength. Complete cure is impossible unless normal function is regained. All obstruction to motion must be overcome. The weak foot, unable to hold itself in proper position, because of weak ligaments and muscles, must be supported until reconstruction takes place in the ankle. Such support is necessary to hold the body in proper relation to the foot.

In all cases, the patient must be provided with proper shoes. The shoes should contain sufficient room for the independent movement of all the toes. This motion is illustrated by the bare-foot child. The shape of the sole should correspond to the shape of the foot, and the heel should be broad and low.

A simple method in the treatment of the weak foot, and an aid in balancing it properly, is to make the inner border of the sole and heel of the shoe slightly thicker, in order to throw the weight on the outer side of the foot. This is of special importance in the treatment of the slighter degrees of weak feet, and is also of service in any grade of flat foot. For the same reason, the feet should be held parallel with each other in standing, and crossed in sitting, to relax the ligaments of the inner side of the ankle.

To strengthen the muscles in walking, the patient should hold the feet parallel with each other, and try to press down the sole of the shoe with his toes, especially employing the great toe. He should avoid standing a long time in one position. In exercising the foot, if any motion is restricted, this should be overcome, so that full range of motion can be maintained. Tiptoe exercises are especially good. The best of all exercises is correct walking, together with massage and special gymnastic exercises. These are of great benefit.

In most cases, a support is needed to hold the foot in proper position, and also to relieve discomfort. This should be worn for a time at least; and by elderly persons, it may be worn indefinitely.

Arch supports should always be made especially for the individual who is to wear them. Their manufacture should be supervised, if possible, by a physician who specializes in orthopedic work. He will take an impression of the foot in plaster of Paris, and from this make a model of the foot. A solid metal arch is then made to correspond to this model.

Much can be done by every one to prevent deformity and weakness of the feet, and to relieve the symptoms of broken arches and weak feet, by selecting proper shoes.

Points in shoes to relieve weak feet:

1. They must be so long that the toes never touch the tips.
2. They should be wide enough to give complete freedom.
3. The heels should be low and broad.
4. The inner side of the foot should form practically a straight line from heel to tip of toe.
5. In many cases, a pliable shank, fitting close under the arch, is better than a stiff, unyielding shank.

MYALGIA

This is a painful inflammatory affection involving the voluntary muscles, also the fascia under the muscles and the covering of the bones. Some writers think it is a disease of the nerves of the muscles.

The difficulty may be brought on by a cold, or by exposure of any kind, such as a draft of air from an open door or window, or sudden cooling of the body after severe exertion. It may be caused by an injury.

Symptoms: These are, stiffness of muscles, and pain on movement. The pain may be a dull ache or of a sharp, throbbing character. The difficulty may last from a few hours to several days. It is more likely to involve the muscles of the back, and often follows a strain from lifting. When these muscles are involved, the stiffness may be so severe as to prevent the patient from rising when in sitting posture, or turning in bed.

Treatment consists in complete rest, hot fomentations applied to the affected parts, and the wearing of flannel or other warm clothing to protect the body from unusual exposure. The use of galvanic electricity often gives relief. The diet should be carefully regulated, constipation overcome, and free elimination encouraged, skin, kidneys, and bowels being kept active.

BRUISES

A bruise is an injury produced on the surface of the body by impact, without causing laceration of the tissues.

It usually causes marked discoloration by hemorrhage in the tissues. Continuous pressure over the seat of injury will often prevent discoloration. Applying hot fomentations will also help to do so. The application of cold is likewise very effective, helping to contract the blood vessels; but cold should not be used continuously for a long time, as it may paralyze the blood vessels. One of the additional advantages in the use of hot applications is the removal of soreness in the parts; and this is also one of the best means of relieving the pain. Arnica and lotions of various kinds have been used to prevent discoloration and also soreness; but none of these give as much relief from pain as

does the use of hot and cold applications, nor do they check the marked discolorations as well.

In case of severe bruises about the body, careful examination should be made by a physician, to determine whether any of the internal organs were injured. In severe bruises about the head, examination should be made to find out whether the skull has been fractured or the brain injured. Such examinations should be made by skilled physicians, for often important symptoms are overlooked. A case will be cited to illustrate this:

A man was struck in the abdomen with the end of a fork handle. He was able to walk a half mile to his home, where heat was applied to the abdomen. A local country doctor was called; but he said there was only a simple bruise, which would soon subside. The patient gradually grew weaker and the pain more acute. The same physician was called again, but made the same diagnosis. Finally, after two days had elapsed, another physician was called; and he immediately discovered that the man was slowly bleeding to death from a ruptured blood vessel in the abdomen, which had been injured by the blow. It was too late to operate, and the man died. This man's life might have been saved had a proper examination been made in the beginning.

In severe bruises, complete rest of the part involved, and the application of cold, give the most relief.

STRAINS

As a result of severe exercise or exertion, some of the fibers of a muscle or tendon may be ruptured. When such accidents occur, the injured part should be kept at rest. This can be accomplished most effectively by applying adhesive straps, or bandaging the part, having the bandage fit snugly.

Hot applications relieve the pain, and hasten the repair of the injured structure.

CHAPTER 50

Bacterial Diseases of the Skin

BLACKHEAD (COMEDO)

Blackhead, technically called comedo, is a chronic affection of the oil glands of the skin. The duct of the gland is filled with a plug of oily material, which usually just reaches the surface, although it may extend slightly above it. Comedones may exist independently, but as a rule, are associated with other diseases, as oily seborrhea or acne.

Causes: Various causes have been ascribed for comedones, but it is quite evident that no one cause is solely responsible. Age seems to be a determining factor, as most cases begin about the time of puberty. The reason for this evidently is the fact that there is an increased activity of oil glands at that time. Comedones commonly last until the age of thirty, when they voluntarily disappear. There are many exceptions to this, as they have been observed in children, and also in old age.

Any disease or condition that affects the general health predisposes to comedones. Digestive disturbances, constipation, and anæmia seem to be in the lead as causative agents. Many observers of late ascribe them to a very small germ, which invariably is found in the soft portion of the comedones. Whether the germs are the sole cause is not known, but we have reason to believe that they greatly assist in making the trouble chronic.

Symptoms: Comedones occur wherever oil glands may be found. They appear as white, gray, brown, or black dots upon the skin. The size varies from a mere point to a pinhead or even larger. Generally they are found upon the face alone, but they may appear upon the upper chest and back. When fully developed, they look like gunpowder embedded in the skin. Comedones usually occur separately, very rarely coalescing, and in any number from a very few to many hundreds. When expressed, they give the appearance of a yellow cylinder with a black, firm top and a soft lower portion; and for this reason, they have been erroneously called "flesh worms." In most cases, there are no

symptoms of itching or pain, and the only distress is the mental distress caused by a knowledge of their presence.

Treatment: To effect a cure, the treatment must be constant, and faithfully applied for a prolonged period. The general conditions must be improved before one can expect much from local treatment. If anæmia is present, the diet must contain such foods as are rich in iron. If constipation exists, laxative foods are imperative. Tea and coffee, and all alcoholic beverages, including sweet wines and beer, should be rigidly barred from the diet. The patient should spend much time in outdoor exercise. The face should be washed daily with hot water and soap, then fomented for ten minutes (see chapter 10), and immediately afterwards washed with warm water containing one level teaspoonful each of borax and baking soda to a quart of warm water. The blackheads should then be squeezed out, either with the fingers or with a "comedo extractor," which can be purchased at a good pharmacy. The loop of a small wire hairpin is a satisfactory means of removing them.

The following prescription is probably the most effective local application. It should be shaken well and applied each night, following fomentations. The best method of application is to mop the face with a small piece of cotton or gauze saturated with the fluid.

R

Zinc sulphate	48 grains
Potassium sulphide	48 grains
Water	4 ounces

PIMPLES (ACNE)

Acne is a chronic inflammatory disease, occurring in and around the oil glands of the skin. It manifests itself in papules, pustules, and many times in nodules and small abscesses. The eruption is located where the glands are most abundant, oftenest upon the face, the back, and the upper chest. It is a very common disease, and affects men and women alike.

Causes: Age seems to be the greatest causative factor in the disease, as most cases occur between the ages of fifteen and twenty-five. Any condition that has a tendency to lower body resistance predisposes to acne. Digestive disturbances and constipation have long been known to be very prominent factors in the cause of this disease. Excessive fats in the diet have an influence. A poor quality of food and improperly cooked food also play an important rôle.

Many specialists are now inclined to believe that the specific cause of acne is a small microörganism called the acne bacillus.

This germ is always present, and probably is the exciting cause of the disease.

Symptoms: Aene is simply an infected comedo, which develops into an intensely red papule (pimple). Many times, the blackhead can still be seen in the center. The eruption generally becomes pustular in from one to three days, although the pus may not come to the surface for a week or even longer. In some instances, resolution takes place without the formation of a superficial pustule; and in other instances, small abscesses develop.

As a rule, if the pustules are left alone, they spontaneously rupture, discharging a thick, white pus. There is ordinarily no crusting, although there may be considerable searring. The eruptions vary from the size of a pinhead to that of a split pea; and their number ranges from a few to several hundred. They may be very superficial or quite deep-seated. Many times, when deep-seated, they are slow to develop pustules and become hard. Frequently the eruption is multiform; that is, comedones, papules, and pustules can all be seen at the same time. There is no tendency for the papules to be grouped in any special arrangement. They sometimes come out in successive crops following an acute attack of indigestion or constipation. There may be slight itching and some pain in the deep-seated abscesses, but oftener there are no symptoms of which the patient complains.

Treatment: Local treatment alone is not very effective unless the habits of the patient are regulated. Good hygienic living is imperative. The bowels must be kept free and active. The diet should be plain but nutritious, all fried and highly seasoned foods being avoided. Meat, pork in particular, also pastry and pickles, are contraindicated. Candy is known to aggravate the disease, and for that reason, should be avoided. Alcoholic beverages, including sweet wines and beer, are not permissible. If anemia and chlorosis exist, they must be corrected.

General tonic treatments and plenty of open air exercises are quite necessary. Fruits, especially figs and prunes, should have a prominent place in the diet. The local treatment consists in keeping the skin free from grease and dirt by washing daily with soap and water. This is best done in the evening, followed by fomentations to the face (see chapter 10) for about fifteen minutes, after which all comedones should be removed. Open all pustules with a sterile needle or small knife, and apply the following lotion:

R

Potassium sulphide	1 dram
Zinc sulphate	1 dram
Water	up to 4 ounces

In the above prescription, the first ingredient should always be fresh if the best results are to be expected.

In many cases, acne is very stubborn, and requires more heroic treatment. For such cases, actinic rays, X rays, or vaccines are to be recommended; but for the employment of these agents, a competent specialist should be consulted.

The relation of this disease and its relief to an excessive sugar content of the blood is discussed under "Boils," on page 537.

SEBORRHEA

Seborrhea is an inflammatory condition of the scalp, involving the oil glands. It manifests itself in two main forms, the *oily* and the *dry*; and as the symptoms of these two affections are entirely different, they will be considered separately.

Oily Seborrhea. This condition is characterized by an oily condition of the scalp and the hair, caused by an oversecretion of the sebaceous glands. The amount of oil varies greatly, from a slightly oily condition to an excessive amount, which has a tendency to mat the hair, especially in women. The disease generally affects the scalp alone, but may appear on the forehead and the nose. It is quite common, and affects men oftener than women, probably because of their more frequent contact with infected objects, such as combs and brushes.

Causes: The disease almost invariably manifests itself between the ages of fifteen and fifty years, being rarely found in children and old people. Too free a massage of the scalp may stimulate the glands to excessive secretion, and bring on a mild attack of the disease. But the real cause of oily seborrhea is the acne bacillus, which imbeds itself deeply in the hair follicle, thus making the disease very chronic. Oily seborrhea seldom if ever is cured, but it can be greatly relieved by efficient and continued treatment.

Symptoms: The affection, as before stated, confines itself almost wholly to the skin of the forehead, nose, and scalp, but under certain rare conditions, may extend over a greater or lesser portion of the body. The scalp and the hair usually become abnormally greasy. In most cases, dandruff is absent, although it may be present periodically with the oily condition. Frequently the hair follicle is dilated, and there is more or less loss of hair. Occasionally complete baldness ensues.

Treatment: See under "Dry Seborrhea" for treatment.

Dry Seborrhea. Dry seborrhea is commonly known as dandruff. It is simply a drying and falling off of the external cellular layer of the scalp. It was formerly thought to be a mass

of dry, scaly, oily crusts; but this idea has been proved untrue. The disease is restricted to civilized men, never being found in savages. Children never have it until they are infected by using the comb or brush of some one who has the disease.

Causes: Dry seborrhea is an acquired disease due to the use, as above stated, of infected combs and brushes. More men than women contract the disease, as would naturally be expected. Dry seborrhea is caused by a peculiarly formed germ called the bottle bacillus.

Symptoms: The scalp may appear quite normal, but is usually dry and at least partially covered with scales. Inflammation is not ordinarily present, but under certain conditions, may develop. There is more or less falling of the hair, and many cases of baldness can be attributed directly to this affection. A varying amount of itching is always present.

Treatment: The treatment for the oily and the dry seborrhea will be considered together, as it is the same, with the exception of massage. In dry seborrhea, massage is always indicated; and in oily seborrhea, it is always contraindicated. The general health should be built up, but the most efficient treatment is local. The following prescription is as effective as any:

R

Resorein	2 drams
Glycerin	1 dram
Alcohol	2 drams
Rose water	up to 4 ounces

Apply night and morning. Shampoo the hair once or twice a week, as necessary.

BOILS (FURUNCLE)

This infection is an acute abscess of the skin, caused by one of the pus germs. The germ gains entrance to the skin by way of a hair follicle, an oil gland, or a sweat duct; and the back of the neck is usually a good seat for the boils, on account of friction produced by the collar. Any lowered resistance of the body predisposes to boils, especially diabetes, Bright's disease, and malnutrition.

Symptoms: Boils are either superficial or deep-seated, the latter being more common. Deep in the skin the infection begins, by causing a hardening and swelling of the tissues. Many times, this can be felt before it is visible. After about two days, the boil reaches the surface and is red and painful. In three to five days more, the abscess becomes quite elevated, pointed, soft, and well defined. Soon the top turns yellow, and if not opened, will

spontaneously rupture and discharge a varying amount of pus. In many cases, a firm central mass consisting of dead tissue is thrown off, which is called the core; and after its expulsion, healing rapidly takes place. As a rule, there are no decided symptoms with boils, other than pain; but in some instances, there are light chills, headache, and general *malaise*. The old theory that boils contained impure matter from the blood, and saved the individual from a hard sickness, has long been proved untrue, as the pus discharged from boils is simply dead white cells that have lost their lives in battling with the infection.

Treatment: The underlying factor in the treatment of boils is the building up of body resistance. In years past, sulphur and brewer's yeast have both been recommended for boils, but with no great degree of success. For local treatment, instead of the ordinary poultices, apply hot compresses wrung out of a saturate solution of boric acid. As soon as there are evidences of softening, the boil should be lanced, and the hot boric acid compress continued. If a poultice is desired, one prepared from ground flaxseed is good.

When the boil has reached considerable size and is surrounded by a considerable area of redness, it should be opened by a physician, even though softening is not evident.

Great care should be exercised not to squeeze or press the boil too hard, as this is liable to spread the infection to adjacent parts, and develop more boils, or enlarge the one already present.

Bacterial vaccines are often useful in case there are repeated boils lasting over several weeks or months.

Recently it has been shown that there is an important relation between boils and the presence of an excessive amount of sugar in the blood. This of course can be determined only by accurate chemical examination of the blood. When it is found to be the case, great relief can be given by restricting sugar and starches in the diet. (See chapter 20.)

CARBUNCLE

Carbuncles are an acute inflammation of the skin and the immediate underlying tissue, caused by an infection with some variety of pus germ. They start very similarly to boils; but instead of pointing, they flatten out, and the hardening of the surrounding tissue is much more pronounced. They usually attain a size from one half inch to three inches in diameter, but are not so definitely outlined as boils. Generally chills or chilliness, slight fever, and headache are present. Several openings are formed in the skin covering the carbuncle, through which the pus is discharged. Later the entire skin over the carbuncle

sloughs and leaves a craterlike ulcer. There is much more pain in carbuncles than in boils. The usual location is the back of the neck and between the shoulder blades.

Treatment: The best treatment for carbuncles is surgical, and a good surgeon should be consulted as soon as they develop; but if it is impossible to obtain such services, paint the surface with iodine, and follow with hot compresses wrung out of a saturate solution of boric acid, which will often be beneficial. Hot and cold to the part (see chapter 10) always brings good results. Add lysol to the water in both tubs, in sufficient quantity to make about a ten per cent solution—one teaspoonful to the pint. Treat for one half hour at a time, two or three times a day.



Impetigo

IMPETIGO

Impetigo is an acute contagious disease of the skin, caused by one of the pus-producing germs. It is very common, manifesting itself mostly among the children of the poorer classes. While it is a disease of childhood, older persons are not wholly ex-

empt. The affection being of germ origin, it can be transmitted from one part of the body to another by auto-inoculation.

Symptoms: The first indication of the disease is the appearance of vesicles, or blisters, which are filled with a clear fluid; but at the end of twenty-four hours, this becomes purulent. They soon dry and form a crust, which is very superficial, and looks as though it were only "stuck on." The vesicles are flat and thin, and seldom coalesce. There is an inflammatory area between them, which makes the disease easy of diagnosis. The eruption nearly always is found around the mouth and on the chin, although it may appear elsewhere. There may be few or many of the lesions, no definite amount being characteristic of the disease.

Treatment: There is nothing more efficient in the treatment of impetigo than ammoniated mercury ointment: for children, 5%; and for adults, 10%. This should be applied twice a day until the eruption ceases and the disease is cured.

Parasitic Diseases of the Skin

SCABIES

Scabies is one of the most distressing of all diseases. It is commonly known as itch, and is caused by an animal parasite called the itch mite. This mite is yellowish white, and just about visible to the naked eye. The female, which is twice the size of the male, burrows beneath the skin to deposit its ova. At the point of entrance, there develops a papule or vesicle and sometimes a pustule. Severe itching soon follows, which excites scratching.

Symptoms: Soon after the itch mite gains entrance to the skin, it burrows in either a straight or a zigzag course for a distance of one eighth to one half of an inch. This leaves a linear elevation of a grayish or blackish color. The burrows are peculiar to scabies, and when found, make a positive diagnosis of the disease, although true cases of scabies have been known where no burrows could be found.

In addition to the eruption due to the entrance of the parasite, papules, vesicles, pustules, or crusts may develop, caused wholly by excessive scratching. The itch mite has a preference for the surfaces between the fingers, the flexor surface of the wrists and arms, the axillæ, the breasts, the umbilicus, the buttocks, and the inner side of the thighs and legs. This distribution is characteristic of scabies, and when present with the burrows above mentioned, makes a positive diagnostic feature. The face is exempt from the eruption except in infants, when it may be infected.

The itching is constant and often very distressing, many times out of proportion to the number of parasites, and is much worse at night than in the daytime. Severe inflammation may come as a direct result of infection from scratching. The disease



An Itch Mite

may be fully developed in two weeks, as the eggs hatch in six days, and the parasites grow very rapidly. The disease persists for months, and in many cases, if not properly treated, for years, and for this reason has been popularly styled "seven-year itch." It is caused by close body contact with some one who has the disease, or by occupying an infected bed or wearing infected clothing.

Treatment: The outlook is very favorable, as any case of scabies can be completely cured in two to three weeks. The old remedy, sulphur, is perhaps the best yet known; but the sulphur works better when combined with either balsam of Peru or beta-naphthol. The balsam of Peru is probably more efficient, but more irritating, than the beta-naphthol. Either of the following prescriptions will be found very efficient in the treatment of scabies:

R

Precipitated sulphur	4 drams
Balsam of Peru	2 drams
Cold cream	4 ounces

Or

R

Precipitated sulphur	4 drams
Beta-naphthol	2 drams
Cold cream	4 ounces

The directions are the same for both of these prescriptions. First take a prolonged warm bath, using laundry soap and a brush. The object of this is to remove all crusts, so that the ointment may gain ready entrance into the skin. Following the bath, anoint all infected areas thoroughly with the ointment. Repeat morning and evening for three days. After the last application, take another bath, removing all ointment, and change all clothing and bed linen. Be sure that the clothing and the bedding are thoroughly sterilized before using again, so as to prevent reinfection. After the second bath, anoint the body twice a day with cold cream to allay the eruption. It must be remembered that an itching following the treatment here outlined may be due to the irritation of the ointment, and not to the scabies. Great care must be taken to recognize this fact, so as not to prolong the treatment and thereby produce dermatitis, which might be more annoying than the original trouble. It is better to follow the directions and repeat in a week's time if the disease is not cured, than to overtreat.

LOUSINESS (PEDICULOSIS)

This is a contagious disease caused by animal parasites commonly known as lice, of which there are three varieties, inhabiting

three different parts of the body, consequently giving rise to as many different maladies. These are pediculosis capitis, pediculosis corporis, and pediculosis pubis. They all are characterized by the presence of lice, hemorrhagic points, and scratch marks.

Pediculosis Capitis. This is an invasion of the scalp by head lice, which excites severe itching. Scratching causes an oozing of serous fluid, which may become purulent or bloody, and perhaps both. This usually dries in the form of crusts, but may remain a fluid and mat the hair. In either event, a foul odor is quite likely to be emitted. Sometimes only a few lice may be found, while again so many are present that they wander around, and in men, may enter the beard. The parasites live at the base of the hair, near the scalp, and are light green in color, large enough to be seen with the naked eye. During the short space of six days, the female can lay as many as fifty small grayish bodies called ova, or nits. These are glued to the shaft of the hair, and can be seen in great abundance. They hatch in three to eight days, and the young lice are able to reproduce in two weeks. This accounts for the rapidity of their multiplication.

The disease is brought about either by personal contact or by the wearing of infected hats. All unsanitary conditions are predisposing factors. Girls are oftener affected than boys, and children than adults.

Treatment: The condition can be cured in the course of a week or so, but requires persevering effort. Crude petroleum seems to be the best remedy. At night, soak the hair with the petroleum, either full strength or mixed with an equal quantity of olive oil, then bind it up with a towel. Usually one or two applications are quite sufficient. Be careful to keep away from fire, and do not let the petroleum drip down upon the face or the neck. Remove the oil each morning by shampooing the hair and the scalp thoroughly with soap and water; and for several days following, wash the hair with a solution containing a teaspoonful of soda to a pint of water. This will loosen the nits, and they can be removed by the use of a fine-tooth comb. The above treatment should be repeated until all the parasites are destroyed.

It is seldom if ever necessary to sacrifice the hair of women, unless badly matted; but in children, it is advantageous to have the hair clipped quite close, as this greatly facilitates the killing of the parasites and the nits.

Pediculosis Corporis. This disease is caused by the body louse, which is one third larger than the head louse. It inhabits the seams of the underclothing, especially in the regions of the back, the chest, and the waist line, and deposits its ova there.

The nits hatch in about six days, and the young lice are able to reproduce in two weeks' time. They are present on the skin only when out sucking blood, which produces a tremendous itching. In some instances, this may be so severe that it induces intense scratching, which brings about a hemorrhagic condition. If the clothing has recently been changed, parasites may not be easily found on the body; but the itching, the hemorrhagic spots, and the linear scratch marks are usually sufficient to diagnose the disease. It is almost invariably found among the poor who live in unsanitary quarters.



A Body Louse

If one is exposed to conditions where lice may be encountered, the following measures are a safeguard:

1. Take off the underwear at night.

2. The underwear and the socks should be changed twice a week, and subjected to a good laundering. Soap-suds and boiling water will kill both nits and adults.

3. At night, upon retiring, dust an ounce of naphthalene into the bedding; or use naphthalene-creosote-iodoform powder for the same purpose (two per cent creosote, two per cent iodoform, and ninety-six per cent naphthalene).

4. The seams of the inner garments, and the trousers at the crotch, and the coat at the axillæ may be smeared with "vermijelli" (crude mineral oil nine parts, soft soap five parts, and water one part). This will asphyxiate the young as they hatch.

Treatment: In order to eradicate the disease, it is necessary to disinfect the clothing and the bedding thoroughly. Articles that can be boiled or baked should be thus treated, and all others should be fumigated with sulphur. (See under "Care of Contagious Cases," chapter 14.) If any of the parasites inhabit the hairy region of the axillæ or chest, they should be killed either with kerosene or with sulphur ointment.

Pediculosis Pubis. This is a condition of the pubic region caused by the crab louse, which is the smallest of the three varieties of lice, and nearly round in form. When active, it produces intense itching and an eczematous condition.

Treatment: The hairs should be shaved closely, and the parts washed twice daily with soap and water. After each cleansing, apply a 1/500 solution of bichloride of mercury. This

is generally preferable to ointment; but if the latter is thought best, a ten per cent ammoniated mercury ointment is advisable.

RINGWORM OF THE SCALP

This disease, technically called *tinea tonsurans*, is a very contagious affection of the scalp, caused by a ringworm parasite. It is seldom if ever seen in persons over fifteen years of age. Partially bald spots are formed, usually covered with scales. This variety is the commonest of all ringworms. It is so prevalent that there are few schools in which at least one case cannot at any time be found.

Cause: The disease is caused by personal contact with some infected person or article, and is commonly contracted either in a barber shop or by wearing some one's infected hat.

Symptoms: The incubation period for the parasite is three days. When fully developed, it produces an eruption, which at first manifests itself as small, round, reddish, scaly spots with vesicles. These enlarge steadily, oftentimes with great rapidity.



Ringworm in a Hair



A Crab Louse

When fully developed, the lesions lose their red appearance, and become either round or oval well circumscribed patches. They vary in number and size. Sometimes they occur singly, but oftener there are several. In long-standing cases, the spots may coalesce, making a very irregular appearance. At first, the hair shows no evidence of disease; but later that in the area involved becomes dry, lusterless, and brittle, soon breaking off, leaving short stumps, which yield readily to traction. Baldness is generally incomplete, but

occasionally may be complete, although not permanent. There is more or less itching constantly present, but it is seldom severe.

Treatment: The ultimate cure is good, as all cases spontaneously heal at puberty; but prior to the age of fifteen, many

cases manifest a very stubborn nature. The following ointment, if rubbed in the lesions twice a day, will produce the best results that can be obtained from medical treatment:

R

Salicylic acid	½ dram
Ammoniated mercury	1 dram
Cold cream	up to 1 ounce

The hair should be shaved or clipped before the application of the ointment. In the stubborn cases, it may be necessary to use the X ray or the actinic quartz light; but this should be done by a competent specialist, and not attempted by amateurs.

RINGWORM OF THE BODY

Cause: This form of ringworm also is caused by a parasite, and is very contagious.

Symptoms: The disease is characterized by ring-shaped lesions, usually found upon the face, the neck, and the back of the hands. It begins as rounded, reddened patches about the size of a pea, many times irregular, and sometimes scaly. After a few days, they begin to enlarge and become circular, the outer edge consisting of papules and a few vesicles. They grow rapidly, and have a tendency to heal in the center, thus assuming a ring-shaped appearance. When they are fully developed, the size varies from that of a twenty-five-cent piece to that of a silver dollar. The border varies in color from dull pink to deep red.

The rim is slightly elevated, which causes the center, although level, to appear to be depressed. Ringworms as a rule are few in number and remain separate, but two or more may merge, thus making them irregular in appearance. Many times, they do not heal in the center, but remain inflamed and scaly over the entire field. The itching is very slight.

Treatment: The treatment is very simple; and with careful attention, the disease can generally be cured in a few days. The best remedy is ammoniated mercury ointment of either five per cent or ten per cent strength, according to the delicacy of the skin. It should be applied two or three times a day for several days, then followed with plain vaseline until healing takes place. Another good method is to paint the lesion daily with tincture of iodine for several days.

RINGWORM OF THE BEARD (BARBER'S ITCH)

This is a very contagious disease of the bearded area, caused by a parasite. It is often contracted in unsanitary barber shops.

Symptoms: An inflammation appears in and around the hair follicles. The lesions at first consist of small superficial nodules, which later become larger and deep-seated, owing to the fact that the parasites travel down the hair follicles. Inflammation is general over the skin, but most marked over the nodules, which have a tendency to group. Usually there projects from the center of each of the nodules a very brittle hair, which often is broken off and stubby. Thin pus is discharged from the follicles.

Treatment: Any treatment, to be effective, must take into consideration the removal of all hairs from the affected areas. Ordinarily this can be done with little pain to the patient, as they are quite loose in the follicles. Either ten per cent ammoniated mercury ointment or sulphur ointment is sufficient. It should be applied twice a day until evidence is given that the disease has been conquered. Then wash off all the ointment and apply plain cold cream until the skin heals.

TINEA VERSICOLOR

Tinea versicolor, sometimes called pityriasis versicolor, is a very chronic, slightly contagious disease of the skin, caused by a vegetable parasite belonging to the ringworm group.

Symptoms: The lesions are yellowish brown patches, which are very superficial, slightly elevated, and covered with small scales. They vary from a pinhead to a pea in size, and tend to merge, forming large, irregular patches, although possessing sharply defined edges. There are no symptoms of which the patient complains, and he would be unaware that he had the disease but for its appearance. The lesions are found mostly on the chest and the back, but in fully developed cases, may appear on the neck, the shoulders, and the upper arms.

Treatment: Although the disease is a very chronic one, yet with proper treatment, a cure can be effected in a few weeks. First take a rather prolonged warm bath, with rubbing to soften and remove the crusts, then apply the following lotion twice a day:

R

Sodium hyposulphite	4 drams
Glycerin	1 dram
Alcohol	4 drams
Water	up to 4 ounces

If this fails to produce recovery in about two weeks, the following stimulating ointment will be very beneficial:

R

Salicylic acid	1 dram
Sulphur precipitate	2 drams
Cold cream	2 ounces

Constitutional Diseases of the Skin

HIVES (URTICARIA)

Urticaria is an inflammatory disease of the skin, characterized by the appearance of wheals. It is commonly called hives. This is not considered a serious affection, nevertheless it is one of the most distressing skin diseases with which we have to contend. It may run either an acute or a chronic course.

Causes: This malady is caused by a poison within or by one externally applied. The poison acts upon the blood vessels, causing them to dilate, and thus produce a serous oozing in the skin, which is responsible for the eruption. Some individuals are peculiarly affected by certain foods, and when they partake of them, urticaria invariably develops. The list of such foods includes pork, strawberries, sea food, and eggs. Various drugs and serums used for treatment, as well as insect bites, and certain chemicals applied externally, will produce the same distressing effect. When the disease is not caused by external irritants, nor by indiscretions in diet, it is invariably a result of toxæmia due to intestinal putrefaction.

Symptoms: Neither age, sex, nor nationality offers any immunity from the disease. The hives appear suddenly, as firm, œdematous, circumscribed, whitish to pinkish lesions. The area immediately surrounding them is usually slightly reddened. The typical hive is from about one third of an inch to an inch in diameter, but some are much larger. They last from a few minutes to several hours, and then vanish; but as a rule, others quickly come. There is no trace left to mark the location of the lesion. Violent itching in the acute form, and more or less itching in the chronic form, is always present. Scratching gives temporary relief; but the irritation thus produced brings on other and possibly more severe hives, and for this reason, scratching should be entirely avoided. The disease usually lasts from one day to a year or more. When of longer duration than a few weeks, it is recognized as chronic urticaria, and is very resistant to treatment. In the chronic forms, the symptoms are not continuous, but there are intermissions between the attacks.

In children, there is a tendency for the eruption to take on the nature of a papule; therefore it is called papular urticaria.

Treatment: The purpose in the treatment of urticaria is twofold: first, relief from the intense itching; and second, re-

moval of the cause. The external application of a saturate water solution of baking soda, or a bath in which one pound of soda has been dissolved, will give temporary relief. A saturate solution of menthol in alcohol rubbed on is also very efficient. The following lotion will be found as good as any:

R

Menthol	30 grains
Carbolic acid	1 dram
Witch-hazel	1 ounce
Glycerin	2 drams
Alcohol	2 ounces
Camphor water	2 ounces
Water	up to 8 ounces

Many times, an ointment serves better than a lotion. In such cases, the following is very beneficial:

R

Menthol	10 grains
Carbolic acid	20 grains
Camphor	20 grains
Cold cream	1 ounce

Either of these should be applied as freely and as often as is necessary to allay the irritation.

For the removal of the cause, the bowels should be thoroughly cleansed with saline laxatives and enemas. The diet should be free from all substances that are known to produce urticaria, and should consist of those articles which resist putrefaction longest. (See chapter 25.) In other words, use a very plain, simple diet for a few days, and drink plenty of water. If the eruption continues, a thorough cleansing enema will be found advantageous, after which inject into the bowel three or four ounces of water containing a level teaspoonful of baking soda. This is to be retained for absorption, and can be repeated several times a day, if necessary, until relief comes.

Acute urticaria responds quite readily to treatment; but the chronic form of the disease is very resistant, and for its cure, the treatment should be extended over a long period of time.

PSORIASIS

Psoriasis is a very chronic inflammatory disease of the skin, characterized by dry, reddish patches of various sizes, covered with an abundance of silvery scales.

Symptoms: No age is exempt, but three fourths of all the cases appear for the first time in persons less than thirty years of age. The eruption manifests itself first as small papules of

pin-point to pinhead size, usually flat. These are reddish, and early become profusely covered with scales. In most cases, they increase in size rapidly, although in some instances slowly, developing into round or oval patches. These have a tendency to coalesce, forming large, irregular patches. The scales are continually falling off, which makes a strong diagnostic point in the disease. If the scales are mechanically removed, they leave the reddish bases exposed. The lesions are always dry; and if in time oozing or vesicles appear, quite likely the diagnosis is incorrect.

The eruption is invariably found upon the scalp, the elbows, or the knees, and may be limited to these areas; but when it is extensive, the trunk is quite generally involved. In fact, no part of the body is exempt except the palms of the hands and the soles of the feet, although the face is rarely invaded.

As a rule, there are no constitutional symptoms with this skin lesion. Itching is present in varying degrees, and in exceptional cases may be entirely absent. The disease runs a very chronic course, and occasionally disappears, to return after a few weeks or months. It is always worse in the colder months than in the warmer ones. Associated with psoriasis, and possibly a causative factor, are rheumatic and gouty conditions, as well as digestive disturbances.

Treatment: Local treatment seems not to produce any permanent effect, unless the habits of the patient are materially changed. He should adhere rigidly to a vegetarian diet, as this is probably the most important single factor in the treatment of the disease. Some of the best skin specialists have come to this conclusion, and are now excluding meats of all kinds, not excepting fish and fowl, from the diet of their patients. If rheumatic or gouty conditions exist, they must be remedied before recovery from psoriasis can be expected.

The local treatment is very effective as far as a temporary relief is concerned. Several ointments have proved very efficient; but in order to get the most good from them, it is necessary first to remove the scales by a warm bath and slight friction over the parts involved. After the scales have been removed, the ointment can be applied. The remedy that has won possibly the greatest reputation among skin specialists for the relief of psoriasis is chrysarobin ointment. This should be used in the proportion of five to twenty grains to an ounce of vaseline. The weaker ointment should be used first; and as tolerance is gradually gained, the stronger may be applied. It is not advisable for anyone to attempt the use of chrysarobin without a prescription from a specialist; because if not properly used, it excites

dermatitis, and is liable to cause other disturbances, such as nephritis. It also stains the skin and the clothing. Its use should be suspended at once if an inflammation is excited thereby. A safer but possibly less efficient remedy is oil of cade with salicylic acid. The only objection to this ointment is its odor.

R

Oil of cade	1 dram
Salicylic acid	$\frac{1}{2}$ dram
Cold cream	1 ounce

Apply night and morning until there is relief. If the face or any exposed surface is to be treated, the following prescription may be preferred, on account of its color and lack of odor:

R

Ammoniated mercury	1 dram
Salicylic acid	30 grains
Cold cream	1 ounce

This also should be applied night and morning until the lesion disappears. In certain stubborn cases, the X ray or the actinic quartz light should be used; but for these, a competent specialist should be consulted.

PEMPHIGUS

Pemphigus is a rather rare inflammatory disease of the skin, manifesting itself as blebs or blisters, with more or less constitutional disturbance.

Symptoms: The acute form is quite likely caused by some infective agent, although its specific nature is not yet known. The reason for this conclusion is the fact that acute pemphigus is nearly always associated with some fever, *malaise*, headache, and other symptoms of infections. The chronic form is probably of intestinal origin, although we have no definite knowledge to prove the statement. The blisters are of varying sizes, from that of a pea to that of an egg. Their number ranges from only a few to scores, occurring singly or in crops. During the disease, the skin is scarcely if ever free from them. The walls of the blisters are thin and tense, inclosing a clear fluid, which later becomes turbid and sometimes bloody.

Treatment: As long as the cause is unknown, the treatment must be general rather than specific. The best that can be done for the disease is to put the patient in the most hygienic surroundings and build up the general health. For the local lesions, open the blisters as soon as they are formed, and powder them with zinc stearate. The outlook for cases of pemphigus is not good, and probably the mortality will remain high until the real cause of the disease is known.

TETTER OR SALT RHEUM (ECZEMA)

Eczema is the most common of all skin diseases. It is an inflammatory noncontagious affection, which runs either an acute, a subacute, or a chronic course. The disease is represented primarily by erythema (redness of the skin, due to capillary congestion), papules, vesicles, or pustules (pimples containing pus, or small blisters filled with pus); and secondarily by scaling and crusting. There is always considerable burning and itching present throughout the course of the disease. The underlying blood vessels are dilated, with considerable exudation of fluid and cellular elements.

Causes: The causes of eczema are very numerous, but may be divided into two general classes,—constitutional or predisposing, and local or exciting. The former work from within, while the latter work from without. These causes may act independently of each other, but usually they act together; that is, in order for a local condition to bring about the disease, there must first be some constitutional disturbance. The principal local causes may be classified as follows: chemical irritants, including dyestuffs, antiseptics, and strong soap; thermal irritants, including cold, wind, and the sun's rays; and mechanical irritants, consisting of scratching, friction, pressure, and the action of parasites. The constitutional disorders or conditions that predispose to eczema are errors in diet, indigestion, constipation, faulty elimination, lowered bodily resistance, and such diseases as inflammation of the kidneys (nephritis) and diabetes.

Symptoms: The symptoms of eczema, as before stated, run either an acute, a subacute, or a chronic course. There are four primary types of the eruption: erythema, papules, vesicles, and pustules. These may appear singly, or two or more forms may exist together, thus making a mixed form of the disease. Occasionally one type may merge into another form.

Erythematous Eczema. The erythematous form of acute eczema begins with indefinite reddish spots, which soon coalesce and form various sized patches or areas. The skin thus affected is roughened and many times slightly swollen. A sensation of itching and heat is always present. This form may occur anywhere on the body, but is oftenest found on the face or the arms, coming on usually in middle or advanced life. It may run wholly an acute course, or merge into a chronic form, or be transformed into one of the other types of the disease. It clears up by loss of color and scaling, but is very likely to recur.

Papular Eczema. Papular eczema manifests itself in reddish, pinhead sized elevations, which may be seen either singly

or grouped. They have a tendency to coalesce and form irregular patches. The arms, the back, and the legs are the parts most frequently affected. Severe itching is nearly always present. This type is very chronic, and recurrences are to be expected.

Vesicular Eczema. This type of the disease, commonly called weeping eczema, is probably oftener recognized as eczema than any other form. Its onset is characterized by tingling and sensations of heat. Soon pinhead sized vesicles with a reddened base develop. They quickly coalesce and rupture, discharging a sticky serum, which dries and covers the lesion with a yellowish crust. The oozing may continue underneath this crust. Any portion of the body may be affected with weeping eczema, and especially the face of an infant. The outline of this particular form is not sharply defined, being quite irregular. If the disease does not run into a subacute or chronic form, recovery usually occurs within a week or two. Here also there is a tendency to recur.

Pustular Eczema. This form of eczema invades chiefly the face, the scalp, and the other hairy regions. It may be primary, or replace vesicular eczema. The pustules rupture and the dried pus forms a profuse crust. One finds this form of the affection developing oftenest in those living under bad hygienic conditions. In pustular eczema, itching is less noticeable than in any other form of the disease.

Eczema Rubrum. Eczema rubrum is a subacute form, and is brought on by failure of one of the primary lesions, usually vesicular or pustular, to clear up properly. It appears as a reddened swelling.

Chronic Eczema. Chronic eczema, more properly called squamous eczema, is distinguished by inflammation and scaling of a very chronic form, which usually follow an erythematous or papulous eczema. (See color plate, page 29.)

Treatment: Inasmuch as the acute and the chronic form of eczema are decidedly different, their treatment must of necessity be different, the one form requiring sedative and soothing treatment, while the other requires stimulating applications.

Before considering any of the local treatments, it will be advisable to discuss the general conditions necessary to the treatment of eczema. First, regulation of the bowels is essential; and this should be brought about, if possible, without the use of any drugs. Laxative foods, especially fruits, such as figs and prunes, should be eaten. All digestive troubles should be corrected. Have the diet free from all foods known to disagree with the patient. Candies, pastry, sweets, sea food, pork, and, as a rule, all flesh foods, should be discarded. The patient should drink

plenty of water, at least two quarts a day. Among the precautions necessary to the proper treatment of the disease might be mentioned the use of as little water as practicable on the affected part; and when the use of any is necessary, limewater is preferable. It is always better to bathe the parts with sweet oil (olive oil). When the disease affects the hands, rubber gloves worn while handling the water will be found advantageous.

The following prescription is especially good in acute eczema:

R		
	Calamine	30 grains
	Zinc oxide	2 drams
	Zinc carbonate C. P.	2 drams
	Glycerin	30 minims
	Carbolic acid	30 minims
	Limewater	6 ounces

Shake well and use freely. Remove the crust, which is formed every two or three days.

For the vesicular form of eczema, a powder might be more efficient. The following prescription is very beneficial when dusted on the affected parts:

R		
	Talcum	4 drams
	Zinc oxide	4 drams
	Starch	1 ounce

In the subacute stage of eczema, there is nothing better than the use of the prescription given below:

R		
	Carbolic acid	10 grains
	Calomel	15 grains
	Starch	2 drams
	Zinc oxide	2 drams
	Vaseline	4 ounces

Chronic eczema requires a more stimulating ointment; and as a rule, the following general prescription is very efficacious:

R		
	Resorcin	30 grains
	Oil of cade	2 drams
	Zinc oxide	1 dram
	Vaseline	2 ounces

This should be applied freely several times a day; and if, for any reason, a more stimulating ointment is required, the addition of 40 grains of salicylic acid is advised.

It should be remembered that the chronic forms of eczema are very persistent, and the acute forms have a great tendency

to recur; therefore too much dependence should not be put on external applications, but the patient should be treated, rather than the affected area.

LUPUS VULGARIS

Lupus vulgaris, many times called simply lupus, is an infectious disease of the skin caused by the tuberculosis germ. It manifests itself as brownish red nodules, either separate or grouped. These, as a rule, ulcerate and leave scars. Children seem to be more susceptible to the disease than adults, as fully one half the cases reported occur before the fifteenth year of age. It seldom occurs in the United States.

The condition may be purely a local skin affection, or it may be associated with tuberculosis of other parts of the body.

Symptoms: The disease begins as one or more pinhead sized, brownish red nodules, quite deeply seated in the skin. These may or may not project above the surface, and are softer than the surrounding skin. They gradually develop into nodules called tubercles, which usually aggregate into patches of various sizes. The disease may remain stationary for a month or even years; and then degenerative changes may take place, with irregular, shallow ulcers developing.

Treatment: Lupus vulgaris is extremely chronic, and most thorough treatments must be applied if recovery is to be expected. The result then will depend, to a large degree, upon the age and physical condition of the patient, and also upon whether there is tuberculosis in any other part of the body.

In the first place, the treatment should be general, taking into consideration the habits of the patient as regards diet, exercise, sleep, open air, *et cetera*. In fact, he should be treated the same as for tuberculosis of any other portion of his body. For an outline of this treatment, see chapters 46, 47.

For local treatment, the one remedy that has been most satisfactorily used is pyrogallol. It should be used by a specialist, particularly if the lesions are very large or cover an extensive area. For small patches, the following can be safely used; but before applying, make very sure that the disease is lupus.

R

Pyrogallol	2 drams
Collodion	1 ounce

This should be painted on the affected part daily until there is evidence of sloughing. Then discontinue, and foment three or four times a day until the slough falls off. Afterwards use

a plain zinc oxide ointment daily until healing takes place. It may be necessary to repeat this process several times.

The most modern treatment of lupus is the use of the actinic ray as produced by a mercury vapor lamp. Of late, the X ray has been used quite successfully.

LUPUS ERYTHEMATOSUS

Lupus erythematosus is a very chronic disease, consisting of reddish to violaceous patches covered with adherent scales. The lesions are well defined, and occur usually on the nose, the cheeks, and the ears, but sometimes may be found on the scalp and the arms. Occasionally they are so symmetrically arranged on the face as to present the general appearance of a butterfly. In rare instances, the lesions spontaneously disappear; but as a rule, they last for months and years, and then atrophy without ulceration. It is a disease of middle life.

Cause: The cause of lupus erythematosus is still uncertain, but the condition is believed to be due to the action of a toxin produced by some tubercular condition in another part of the body. It differs in this respect from lupus vulgaris, as the latter is decidedly an active tubercular condition.

Treatment: This disease is very resistant to treatment. The kind of applications necessary varies greatly, ranging from a mild lotion to destructive measures. For the milder cases, the following is to be recommended:

R

Zinc sulphate	40 grains
Potassium sulphide	40 grains
Water	4 ounces

This is to be shaken well and applied twice a day.

Sometimes a 30% solution of ichthyol in water, painted on the lesions twice a day, will give relief. For more stubborn cases, tincture of green soap vigorously rubbed in every day or so will produce the desired effect.

If the disease resists this treatment, a competent skin specialist should be consulted. Of late, the actinic ray, the high frequency current, and the X ray have gained in popularity for the treatment of lupus erythematosus; but only persons experienced in administering them should be consulted.

FEVER SORES, COLD SORES (HERPES SIMPLEX)

(See chapter 27.)

SHINGLES (HERPES ZOSTER)

(See chapter 39.)

Various Disorders of the Skin

WARTS

Warts are small, elevated, circumscribed growths of the skin. They are very common, and scarcely any individual has attained the age of maturity without having had at least one. Warts are oftener found in the young than in older persons, although no age is exempt. They are caused by some infective agent, the true nature of which is not yet known; but it is known that warts can be spread by self-inoculation, which proves their infective nature. Recent experimental work also supports this idea.

Although there is only one kind of lesion that we designate generally as warts, nevertheless there are three distinct varieties, which will be considered separately. None of them produce any symptoms of which the patient complains, unless they are so located as to cause discomfort.

The Common Wart. Common warts oftenest occur upon the hand, although they may be found upon other parts of the body. They usually are the size of a pea or even larger, and are horny and irregular on the top, with black specks in them, which have been erroneously called seeds.

The Flat Wart. Warts of this variety are flat, smooth, and almost invariably pigmented. They appear upon the back of the hands, the face, the chest, and the back. This variety in old persons has a tendency to develop into cancer.

The Thread Wart. Thread warts are thin, threadlike bodies attached to the skin. Sometimes, at the top, they become the size of a pea, or even larger, with only a slender cord for attachment.

Treatment: There are three different methods of eradicating warts—surgical, electrical, and chemical. The one most used by the laity is the chemical.

About the only method in which chemicals are employed which can be safely used as home treatment is the application of salicylic acid. This can be applied several times a day for a number of days, until the wart shrivels up and drops out. The acid is used as a saturate solution, or as a mixture with collodion (see under "Corns," this chapter), which can be prepared by any druggist. The use of strong acids or other caustics to destroy warts is dangerous, and should not be undertaken as home treatment.

As for the thread warts, it is practicable to remove them by tying a fine silk thread as tightly as possible around the base. After a few days, the wart will turn black, and then can be easily removed with the fingers.

Warts that do not disappear or are not removed by treatment after some months, should give concern, as they may become cancerous, and should be removed by a physician.

CORNS

Corns are the most distressing of all skin diseases, in consideration of the small area of tissue involved. They are simply an overgrowth of the outer layer of the skin, and generally develop to the size of a pea. Corns are circumscribed, and taper downward to a point, which accounts for the pain when pressure is exerted on them. They are caused, as a rule, by pressure or friction from misfitted shoes.



Poison Ivy

Symptoms: Corns oftenest develop upon the upper or outer surfaces of the toes, near the joints, although they may come under or between them. In the latter instance, the corns are usually kept moist, and are designated as "soft corns," in contrast to the others, which are hard. Hard corns are raised above the surface, and are very painful when

any pressure is brought to bear upon them. A soft corn ordinarily has a depressed center, and many times is more painful than a hard one. The treatment for both kinds is very simple, but the permanency of the cure depends upon the willingness of the patient to wear properly fitted shoes. The following prescription has proved efficient in thousands of cases:

R

Salicylic acid	1 dram
Flexible collodion	1 ounce

For the best results, pare the corn as closely as possible without pain or blood. Apply the medicine with a camel's-hair brush night and morning for several days, then soak the foot in hot water, and remove the crust that has been formed by the medicine, upon which will be found the remaining portion of the corn. If all the corn has not been removed, repeat the process until it is completely eradicated.

POISON IVY AND POISON OAK

Probably one of the most annoying of the skin lesions is that produced by a poison from a species of the ivy, also from poison oak and poison sumac. The eruption caused by this poison is an acute inflammation of a very irritating nature.

Symptoms: The specific poison evidently is an oil that usually is transmitted by actual contact with the leaves of the plant. However, some persons are so susceptible that they become poisoned when simply passing in close proximity to the plant. Within a relatively few hours after the oil has been deposited upon the skin, there develops a marked redness, with swelling and numerous pinhead sized vesicles. These soon merge together, forming large patches, with considerable itching and burning. The back of the hands, the fore-arms, the face, and especially the eyelids are likely to become the seat of the lesion.

Treatment: After contact with the plant, the disease can be either prevented or greatly modified by bathing the parts exposed with alcohol or ether. If neither of these is obtainable, the use of plenty of soap and water is quite effective. By this treatment, the oil is dissolved and removed before it has had opportunity to produce the inflammation. If this preventive measure has not been taken, and a dermatitis is set up, it is still advisable to bathe the parts at least once with one of the solvents mentioned above, after which apply the following lotion:



Poison Oak

R

Boric acid	2 drams
Resorein	1 dram
Pulverized calamine	$\frac{1}{2}$ dram
Glycerin	2 drams
Water	up to 6 ounces

Many times, it is best to saturate a cloth with this lotion and use it as a compress on the affected parts.

ITCHING (PRURITUS)

Pruritus is an affection of the skin, the only symptom of which is an itching, stinging, or creeping sensation, with no ascertainable cause. It may be continuous or paroxysmal, local, or general. Local pruritus usually is found at the anus or the genitalia.

Treatment: Before applying treatment of any kind, be sure there is no cause that has been overlooked. Search diligently for indications of scabies or pediculosis. Have the urine examined for diabetes or Bright's disease. Assure yourself that there are no pinworms or hemorrhoids in the rectum. If no cause is to be found, the disease is probably of a toxic origin. The bowels must be kept active, and the diet should be strictly vegetarian. If the distress is general, apply the following lotion:

℞

Menthol	30 grains
Carbolic acid	1 dram
Glycerin	2 drams
Witch-hazel	1 ounce
Alcohol	2 ounces
Camphor water	2 ounces
Water	up to 8 ounces

If the condition is local, many times the following ointment will be found more beneficial:

℞

Menthol	10 grains
Carbolic acid	20 grains
Camphor	20 grains
Cold cream	1 ounce

For pruritus ani, see chapter 29.

PRICKLY HEAT

This is a mild inflammatory affection of the skin. It is characterized by closely set papules and vesicles, ranging in size from a pin-point to a pinhead. They never group or coalesce, and are always found at the mouth of sweat glands.

Cause: The eruption invariably appears during the hot months of the year, and is caused by free perspiration, violent exercise, hot baths, or excessive clothing. Alcoholic beverages predispose to this condition. Quite likely the exciting cause is a toxin or an acid in the sweat, which irritates the skin.

Symptoms: The eruption consists of reddish papules, which come on suddenly, and produce a sensation of itching, with some burning. Many of these papules become vesicular at the top, containing a clear fluid, which, after a few days, turns to a milky

yellow color, with no tendency to rupture. The eruption usually comes out in crops, which may last during the entire summer. If only one crop appears, it seldom lasts longer than a week.

Treatment: The best treatment is removal of the cause. Light clothing should be worn during the summer months, and persons subject to the affection should be sheltered from the heat and avoid hot drinks and hot baths. The bowels should be kept active, and constipation should never be allowed to ensue. Avoid such articles of diet as are known to aggravate the disease. The following prescription, if dusted on several times a day, will be found very efficient in bringing about relief:

℞	
Menthol	10 grains
Boric acid	2 drams
Zinc carbonate	1 ounce
Talcum	up to 2 ounces

SUNBURN

Sunburn is a congestion of the skin, caused by direct exposure to the sun's rays. The time of exposure necessary to produce the congestion varies with individuals, brunets being less susceptible to it than blonds. After repeated exposures, the skin becomes tanned, and an immunity to the disease develops. The intensity of the symptoms usually abates after the first two days.

The redness of the skin due to sunburn cannot, as a rule, be confused with any other skin condition, because it occurs only after exposure, and affects only the parts exposed. Persons knowing themselves to be susceptible to the influence of the sun's rays should be protected by parasols or broad-brimmed hats. Those who do not regularly bathe in the open, as at beach resorts, should stay in the water but a short time, since many cases of severe sunburn have developed during such exposure.

Treatment: The following prescription should be well shaken and applied twice a day to the affected parts:

℞	
Carbolic acid	10 minims
Boric acid	30 grains
Zinc oxide	30 grains
Glycerin	1 dram
Water	up to 4 ounces

The dusting powder mentioned for the treatment of chafing may also be found valuable in the treatment of sunburn.

CHAFING (INTERTRIGO)

Chafing is a congestion of the skin brought on as the combined result of heat, moisture, and friction. At first, it is dry, and

bright red in color; but later it becomes quite moist. There is usually considerable heat and tenderness associated with the condition. It is prevalent during the warm months; and if treatment is neglected, true eczema may develop. The disease is not acquired except as portions of the skin come in direct contact with each other. This condition usually exists in the region of the buttocks, the axillæ, the groins, the inner surface of the thighs, and beneath the breasts of women. Fat persons and neglected children are very likely to develop chafing.

Treatment: The reddened, moist spaces should be frequently sponged with a saturate water solution of boric acid, after which dust with the following prescription:

R

Powdered boric acid	1 dram
Powdered zinc stearate	3 drams
Powdered talcum	5 drams

The opposing surfaces should be kept separated by gauze or absorbent cotton upon which some of the powder has been previously dusted. No soap or ointment of any kind should be used. If eczema develops, it should be treated as such.

WENS (SEBACEOUS CYSTS)

Wens are cystic tumors of the skin. They contain a mass of oily, cheesy, semifluid matter that has been retained in the duct of the oil gland. The size varies from that of a pea to that of an egg. Wens are scarcely ever found elsewhere than on the scalp, the face, the neck, and the back. They are globular and movable, projecting slightly above the surface. The skin covering them is usually normal in color, although it may be pale, and in some instances is slightly reddish. They are either round or oval, but occasionally are found quite flat. Ordinarily they are painless and harmless unless they become infected, in which event suppuration is liable to ensue. They may remain for years without any increase in size, or they may suddenly take on a new growth.

Treatment: There is no medical treatment of any value for wens. Surgery offers the only permanent relief. They should be opened and the sac carefully removed. If this latter is found impossible, owing to adherence, then the contents should be expressed and the cavity swabbed with tincture of iodine. This treatment requires the services of a physician or a surgeon.

GRAY HAIR (CANITIES)

Gray hair, or canities, is the absence of pigment in the hair. It may be general or in local circumscribed spots. The color

varies from gray to white, and usually comes on gradually, although cases are on record in which the change has been quite abrupt. Occasionally heredity plays a part in its causation; but as a rule, it is acquired.

Causes: After middle life, gray hair naturally comes to most persons, to a greater or less extent. Worry and fear, as well as neuralgia and neuritis, have been known to cause this condition.

Treatment: No treatment seems to be of any value. In exceptional cases, the color may return to the hair if the conditions that caused the disease are removed.

Numerous hair dyes are on the market, but generally these contain poisonous substances and should be avoided. Gray hairs are no disgrace, and there is no reason why they should be disguised.

BALDNESS (ALOPECIA)

Baldness (alopecia) is a partial or complete loss of the hair. Partial alopecia may be either a general thinning of the hair or a complete loss in spots.

Cause: Baldness is either the result of age, or it may be prematurely brought on by disease. The disorders that usually cause it are either local or general. Of the former may be mentioned seborrhea, ringworm, lupus, erysipelas, psoriasis; and of the latter, typhoid, syphilis, intoxications, diabetes, cancer, and tuberculosis.

Treatment: The degree of destruction of the hair follicles determines the value of the treatment. If it is too extensive, no results can be obtained. To be of any benefit, the treatment must take into consideration not only the increasing of nutrition of the hair, but also the destruction of the infection that has been responsible for the condition. Shampoo and salt-glow the scalp about twice a week. Brush it daily with a good hairbrush. Afterwards massage well, except in cases of oily seborrhea. The following prescription is many times of great service:

R

Bergamot oil	½ dram
Castor oil	1 dram
Resorcin	2 drams
Alcohol	3 ounces
Water	up to 6 ounces

The above should be well shaken before using.

Sometimes treatment with an actinic quartz light will prove very effective, but this should be used only by a competent specialist. Loose hats should be worn, so as not to interfere with the circulation in the scalp.

Section XIII—Eye, Ear, Nose

CHAPTER 54

Diseases of the Eye

The eye is one of the most delicate organs of the body. Because of this, there is great need that proper treatment be given when the eye becomes diseased or injured. Owing to its delicate structure, and the large variety of diseases to which it is subject, most eye affections require for their successful treatment the services of a physician who has given special attention to this class of maladies. In this chapter, an effort is made to help the reader to recognize the more dangerous conditions, in order that he may know when to go to a physician for relief; and only the simpler conditions, which can be treated at home, will be discussed from the standpoint of home treatment. (See color plate, page 23.)

COMMON AFFECTIONS OF THE EYELIDS

Chronic Inflammation (*Blepharitis Marginalis*). Chronic inflammation of the margin of the eyelids is very common. (See color plate, page 22.)

Symptoms: The margin of the eyelids is swollen and reddened, and there are numerous whitish scales around the base of the eyelashes. Sometimes the scales are absent; and other cases present yellowish crusts, which glue the lashes together. On the removal of these crusts, small sores (ulcers) are seen. In the latter type, the lashes become distorted and tend to fall out. Other common symptoms are itching, soreness, tears running over the cheeks, and sensitiveness to light. The eyes tire of reading, sewing, and other close work.

Causes: Poor nutrition, a run-down condition of the system, exposure to irritants, such as wind, dust, and smoke, insufficient sleep, overuse of the eyes, the need of glasses.

Treatment: Remove the cause if possible. Thoroughly cleanse the edge of the lids with soap and water applied with a small piece of cotton on the end of a toothpick, using enough friction to remove all scales and crusts. Then dry thoroughly. At night, apply an ointment of boric acid.

Boric acid	3 grains
Vaseline	2 ounces

Sty. This is a localized, acute inflammation at the margin of the eyelid, originating from an infection in one of the oil glands at the base of the eyelash, usually ending in the formation of pus. (See color plate, page 22.)

Symptoms: A red swelling appears at the edge of the eyelid, accompanied by pain and tenderness. Very soon a yellowish point will be seen, indicating pus formation.

Causes: A deranged condition of the system, such as dyspepsia, constipation, poor blood; local irritants; the need of glasses.

Treatment: Apply hot compresses to the eye several times a day. (See chapter 10.) As soon as a yellow spot is seen, remove the pus, either by pulling out the eyelash in the center of the sty, or by opening the sty with a needle that has been sterilized by the passing of the pointed end through the flame of a lamp or of a lighted match. To prevent the formation of other sties, avoid conditions that tend to cause them.

Chalazion. This is a chronic inflammatory enlargement of one of the glands located in the eyelid. (See color plate, page 22.)

Cause: The stoppage of a gland duct, due to inflammation of the margin of the eyelid.

Symptoms: The process develops slowly, with insignificant or no symptoms until the enlargement has reached the size of a pea. The chalazion feels hard, and is situated in the lid, some distance from the margin, but not in the skin. By placing the finger on it, the skin can be moved over it.

Treatment: In the evening, apply two or three very hot compresses, then dry the lid, and apply to the margin boric acid ointment made according to the prescription on page 563. After this treatment for a few evenings, use gentle massage to the swelling. If this fails to reduce the swelling in two or three weeks, get the services of a competent eye specialist.

For other swellings and deformities of the eyelids, consult a physician.

"BLACK EYE"

This is a discoloration of the skin about the eye, caused by the escape of blood into the tissues, following a blow. (See under "Bruises," chapter 49.)

Treatment: For the first twenty-four hours after the injury, use a cold or ice compress for a half hour at a time, every two or three hours. After a day or two, use hot compresses and gentle massage to hasten the absorption of the congested blood.

INSECT BITES

Insect bites on the eyelids cause a great deal of swelling, which is best controlled by cold compresses kept on almost con-

tinuously. A teaspoonful of baking soda to the pint of water used for the compresses will often relieve the pain.

WATERY EYE (EPIPHORA)

“Watery eye” is the overflowing of the tears upon the cheek.

Causes: Increased secretion of the tear gland, as a result of overstimulation of its nerve, a foreign body or other obstruction in the tear duct, catarrh in the tear ducts, inflammation of the lining membrane of the eyelids, catarrh of the nose.

Treatment: In so far as possible, remove the cause. Put on the eye a cold or ice compress for twenty minutes at a time, morning and evening. Drop one drop of a ten per cent solution of argyrol in the eye three times a day. If the argyrol can be blown from the nose in a few minutes after it has been put in the eye, the prospects are reasonably good for a cure. If not, you should see a physician.

CONJUNCTIVITIS

Conjunctivitis is an inflammation of the lining membrane of the eyelids and the membrane covering the white portion of the eyeball. There are several varieties of this condition, which require separate consideration. We will consider first the acute inflammation of this structure.

Causes: 1. Mechanical, such as dust or other foreign bodies in the eye, wind, a hurt, or exposure to intense light. 2. A specific kind of disease germ, which produces “pink eye,” a very contagious form of conjunctivitis. 3. Infection from the germs that get into an open wound. 4. The germs of gonorrhea (see chapter 71). 5. Measles, scarlet fever, and smallpox are accompanied by inflammation of the conjunctiva. 6. This condition is associated with a cold in the head, hay fever, and influenza.

Symptoms: 1. The inflamed membrane is a brilliant red color and somewhat swollen. The inflammation is worse under the lids and on the back part of the white of the eyeball. It usually fades as it approaches the cornea, or clear part of the eye. When the inflammation is worse immediately around the cornea and fades as it extends back on the eyeball, the disease is on the cornea, or some part of the interior of the eye, and is not an ordinary conjunctivitis. 2. A discharge that tends to glue the eyelids together, especially at night. 3. Itching and smarting of the eyelids, or a hot, heavy feeling, sometimes as though there were sand or some other foreign body in the eye. 4. More or less sensitiveness of the eyes to light. The symptoms differ in degree with the severity of the inflammation.

Treatment: The treatment of acute conjunctivitis varies with the severity of the inflammation, and the cause of the disease. If it is due to mechanical injury, measles, scarlet fever, or smallpox, or associated with cold in the head or hay fever, the local treatment is the same, as follows:

Put a level teaspoonful of table salt in a pint of water that has been previously boiled. When the solution is cool, fill an eyecup with it, place the cup to the eye, throw the head back, and open and shut the eye several times, until all secretions are washed from the eye. The eyecup can be bought at any drug store. If both eyes are affected, empty the eyecup and treat the other eye in the same way. Wash out the secretions as often as they collect.

Put in the eye one drop of a ten per cent solution of argyrol three times a day. This solution is a very dark brown liquid, and will stain the clothing, but not the flesh. It should be freshly prepared when used in the eye, not being over ten days or two weeks old, and should be kept in a dark cupboard or drawer during this time.

An ice compress made by chipping ice very fine and placing it between the folds of a towel, kept on the eye for twenty minutes at a time, three or four times a day, is one of the best remedies that you can use.

If the eyelids glue together at night, an ointment of boric acid should be applied to the margin of the eyelids at night.

The cause should be removed if possible; and always remember that whatever you can do which is conducive to health will aid very materially in the treatment of these diseases.

"Pink Eye." In this condition, the local treatment is the same as that just described, with the added precaution that the patient should be isolated from other persons, and washbowls, towels, and other articles used about the face should not be used by other members of the family. Until you are sure of the cause of the inflammation, the patient should be treated in the regular way, care being taken that the secretions from the eyes do not get into anyone else's eyes. (See color plate, page 22.)

Gonorrheal Conjunctivitis. In case the malady is produced by the germ of gonorrhea, the person should be under the direction of a doctor who is specially qualified to deal with such conditions. It is a very dangerous disease, producing more blindness than any other one cause.

Chronic Conjunctivitis. This is a chronic inflammation of the lining membrane of the eye. It is a common ailment.

Causes: A general run-down state of the system, an irritating atmosphere, insufficient sleep, overuse of the eyes, the need of glasses.

Treatment: Removal of the cause is the first and most essential measure.

Build up the general health by spending as much time each day in the open air as is practicable, with moderate exercise, if this is not contraindicated. The diet should be easy of digestion, excluding all concentrated foods. Take a cool rub or plunge the first thing in the morning or the last thing before retiring at night. Correct any constipation that may be present.

Put on the eyes an ice compress made by chipping ice very fine and placing it between the folds of a towel. Apply it to the closed eyes for twenty minutes at a time, three times a day. This is a very important part of the treatment.

Medicines do not do very much good in these cases. Boric acid solution is the one most commonly used. Put three or four drops of a saturate solution in each eye, three times a day.

If the condition persists after three or four weeks of careful home treatment, you should get the services of a physician who has made a special study of eye diseases.

GRANULATION OF THE EYELIDS (TRACHOMA)

Granulation of the eyelids is a very dangerous condition. It leads to many diseases and deformities of the eyes and the lids, such as ulcers on the cornea, which may perforate and become infected, causing blindness; or a chronic inflammation of the eye, which is very troublesome, often leaving large opacities, and thus resulting in partial blindness. The lids, too, are usually affected, producing bad deformities. In the advanced stages, the eyelids roll out, exposing the lining membranes, which become infected, and give much trouble; or they roll in, causing the lashes to rub against the cornea, producing ulcers and opacities. The glands in the mucous membrane are destroyed, leaving the eye very dry, which is a most uncomfortable condition. Persons afflicted with trachoma should be extremely careful that they do not use about their eyes anything that others are obliged to use. The treatment cannot be successfully carried out at home, but should be given by one who has had special instruction and experience with this condition.

ULCER OF THE CORNEA

Ulcer of the cornea, or the anterior, clear part of the eye, is a very common disease.

Causes: Poor general health; other inflammations about the eyes, such as inflammation of the lining membrane, and of the

tear sac or ducts; traumatism produced by foreign bodies in the eye, the scratch of a finger nail, or misplaced eyelashes; acute infectious diseases, such as smallpox, herpes, gonorrhea, trachoma, and diphtheria.

Symptoms: Congestion and inflammation immediately around the cornea, fading as it leaves the cornea; a white spot on the cornea; sensitiveness of the eyes to light; tears running over the cheek; blurring of the eyes. (See color plate, page 22.)

Treatment: Remove the cause. Build up the general health. Put one drop of a ten per cent solution of argyrol in the eye three times a day. Put fomentations on the eye for a half hour at a time, several times a day. Keep the eye covered with a bandage, or use very dark glasses. Do not use the eyes, especially for close seeing. If the condition persists, get the services of a physician.

Scars or opacities on the cornea are not cataracts, as many people think. They are caused by ulcers or inflammation of the cornea. They can be helped only when they are of less than one year's standing.

Fomentations over the closed eye, followed by gentle massage through the eyelid, is the most successful treatment.

If they are so bad that they produce blindness, a physician should be consulted.

IRITIS

Iritis, or inflammation of the iris—the colored part of the eye around the pupil—is a serious eye disease. It requires very careful treatment. One who has made special preparation in handling eye diseases, should have charge of the case.

Causes: Syphilis or gonorrhea; infected tonsils, ears, or sinuses in the head or face; pyorrhea in the gums; diabetes, scrofula, or injury; sometimes a sympathetic condition from injury of the opposite eye.

Symptoms: The iris looks dull and swollen, and the color is changed. The pupil is contracted. There is a redness immediately around the cornea, in the white part of the eye. Farther from the cornea, it fades. Pain is very severe. It is worse at night. Light hurts the eyes. Tears run over the cheeks. The vision is dimmed. (See color plate, page 22.)

Treatment: Remove the cause if possible.

With this disease, it is necessary to use a poisonous drug, atropine sulphate, in the eye. It should be used only under the direction of a physician, except when such services absolutely cannot be had. Under such conditions, get a one per cent solu-

tion of atropine sulphate from a pharmacy. (This medicine, being very poisonous, should be kept away from children.) Put one drop of the solution in the eye every three hours until the pupil is completely dilated, which ordinarily will be in about twenty-four hours. After the pupil is dilated, use just enough to keep it dilated. Usually one or two drops a day is sufficient. This treatment is very important.

Put hot fomentations on the eye several times a day.

Require absolute rest in bed for the first few days, protect both eyes from the light by darkening the room or by the use of very dark-colored glasses, and keep a bandage over the diseased eye.

Keep the bowels open.

CATARACT

Cataract is any opacity of the crystalline lens of the eye or its capsule. This opacity is always located just back of the iris, in the pupil. The pupil looks milky or white in case of cataract. Any other opacity in or on the eye is not a cataract. The principal symptom is dimness of vision. (See color plate, page 22.)

The cause of cataract is not very definitely known, but strong light is one of the predisposing causes. People that live in hot desert regions seem to have cataracts more frequently than do those living in other places; also people who do electric welding or use the electric arc light in their employment. The best preventive under these conditions is the wearing of glasses, with lenses made from Crookes glass. The need of glasses seems to be a cause in some cases.

Treatment is surgical in almost all cases—the removing of the crystalline lens of the eye.

PTERYGIUM

Pterygium is thought by many people to be a cataract; but it is not. It is a triangular fold of membrane extending from the outer or inner part of the conjunctiva of the eyeball to the cornea. The apex is immovably united to the cornea. The base spreads out and merges with the conjunctiva.

Symptoms: A pterygium is usually rich in blood vessels and hence of a red color. It slowly grows toward the center of the cornea, and may eventually cover a considerable part of the cornea. It produces more or less irritation, and interferes with vision. (See color plate, page 22.)

Treatment consists in removing the growth by an operation. This should be done by a surgeon qualified for such work.

FOREIGN BODY IN THE EYE

A foreign body in the eye is a very common accident. The foreign body usually lodges between the eyeball and the eyelid. It should be removed at once, that the eye may not be scratched or become infected.

To remove such particles, the patient should be seated, facing a good light. Daylight is almost always the best. When the foreign body is in the lower part of the eye, the lower lid should be everted by placing the ball of the thumb on the lower lid,



Left: Everting the lower lid to remove a foreign object from the eye. Right: Everting the upper lid. The swab is made of a toothpick wrapped at one end with cotton. The lids are everted over a match stick.

close up to the eyelashes, then gently drawing the lid down, at the same time asking the patient to look up toward the eyebrows. This exposes the lower part of the eyeball and the inside of the lower eyelid. The foreign body can be located, and removed with the corner of a clean, soft handkerchief, or preferably a small loop of horsehair about a quarter of an inch in length glued into the end of a stick. It would be well to have this instrument made and be ready for an emergency.

When the foreign body is on the upper part of the eyeball or on the inside of the upper eyelid, evert the upper lid, so that the upper part of the eyeball and the inside of the upper eyelid are exposed. To do this, ask the patient to look down to the

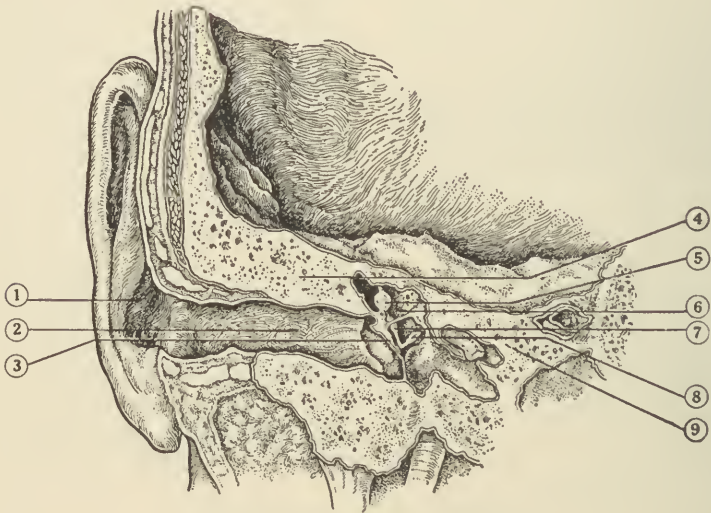
nose, then grasp the upper eyelashes, about the middle of the eyelid, between the thumb and the index finger, draw the lid down and out, and with the end of a pencil or the finger, press down on the center of the eyelid about a half inch from its margin, at the same time lifting the edge of the eyelid by the eyelashes. In this way, the eyelid can be completely turned over, so that the entire under surface is exposed. The foreign body can be located and removed by use of the same means as that used for the lower part of the eyeball and the lower lid.

After the foreign body is removed, the eye should be treated for acute conjunctivitis. (See under "Conjunctivitis" in this chapter.)

Many times, the foreign body strikes the cornea, and becomes embedded in it. Under such circumstances, the patient should be taken to a physician and have the foreign body removed and the eye treated.

Diseases of the Ear

The ear is divided into three parts: 1. The external ear, consisting of the auricle, the part that we see, and the auditory canal. 2. The middle ear, comprising the drum, a small cavity just internal to the drum, the mastoid cells, and the Eustachian tube. 3. The inner ear, containing the endings of the nerve of



EXTERNAL AND MIDDLE EAR

- | | |
|----------------------------------|-------------------------|
| 1. Outer ear | 5. Malleus, or hammer |
| 2. External auditory canal | 6. Cavity of middle ear |
| 3. Eardrum, or tympanic membrane | 7. Incus, or anvil |
| 4. Bone | 8. Stapes, or stirrup |
| | 9. Bone |

hearing, and other special nerve endings that have to do with the equilibrium of the body.

The auditory canal is composed of a cartilaginous and a bony portion. It is about one and one fourth inches in length. The outer or cartilaginous portion is about one half inch in length. This portion of the canal contains hair follicles and oil glands. These glands are most numerous at the junction of the bony and the cartilaginous portion. The glands secrete the earwax. Sometimes they become infected, and the result is a

very painful condition. In fact, it is a little boil within the ear canal. The canal is narrowest at its central portion, beyond which it again expands, terminating at the drumhead. This adds to the difficulty of removing a foreign body from the canal, should it be beyond this portion of the canal.

The drumhead is a thin elastic membrane stretching across the inner end of the external auditory canal, separating the canal from the cavity of the middle ear. When there is a gathering, or collection of pus, in the middle ear, this is the membrane that breaks, or is lanced by a physician. The cavity of the middle ear is about one half inch by one third inch by one fifth inch. It communicates with the throat by means of the Eustachian tube, and with the mastoid cells, which are located in the bone just back of the ear. Three small bones or ossicles extend from the drum to the inner wall of the middle ear. They assist in carrying the sound from the drum to the nerve of hearing in the inner ear.

TESTS FOR HEARING

A tuning fork, note C_2 , is the most useful instrument for testing the hearing. In case the deafness is in only one ear, strike the tuning fork on a piece of solid wood, then place the end of the handle in contact with the teeth, or on a point on the top of the head midway between the ears. If the deafness is caused by some disease in the middle or external ear, the sound will be heard loudest in the deaf ear; but if the hardness of hearing is due to disease of the inner ear, or the nerve of hearing, the note of the tuning fork will be heard less distinctly in the deaf ear.

If there is deafness in both ears, hold the vibrating tuning fork with its tines as close to the ear as possible without touching it. Take your watch and note the time during which it can be heard. It should be from thirty to fifty seconds. Again hold the end of the handle of the tuning fork, after vibrating it, on the bone just back of the ear, and note the time that it can be heard. It should be from twelve to twenty seconds. If the time that the fork is heard is materially reduced when it is held in the air, and not reduced when the end of the handle is placed against the bone back of the ear, the condition producing the deafness is located in the middle ear or the external auditory canal. If the time that it is heard is reduced both when it is held in the air near the external ear and when it is held on the bone back of the ear, the disease is located in the inner ear, or in the nerve of hearing.

CAUSE OF DEAFNESS

By far the most common cause of deafness is chronic catarrh of the nose and throat, which extends through the Eustachian tube to the middle ear. Anything that obstructs the Eustachian tube, such as adenoids, a cold, or catarrh, will produce deafness. Wax or a foreign body in the external auditory canal, injury to the drum and bones of the middle ear, diseases of the inner ear and of the nerve of hearing, are also causes of deafness.

INFECTION OF THE EXTERNAL AUDITORY CANAL

Furunculosis, or boil, in the external auditory canal is an infection of one or more of the sebaceous glands, with pus-forming bacteria. It is usually the result of scratching the auditory canal with a dirty finger nail, hairpin, match, or other object. The condition is similar to that of boils and felons occurring elsewhere on the body.

Symptoms: There is at first an itching within the canal. Soon the canal becomes tender to the touch, and later it becomes very painful. Deafness is not a marked symptom until the swelling is large enough to close the canal. The boil will rupture in from two to eight days, the time depending on the depth of the infection. When it ruptures, the acute pain will subside.

Treatment: Irrigate the canal four or five times a day with water as warm as can be borne, using four drops of lysol to the pint of water. Have the patient lie on the well side, and keep a hot water bottle over the diseased ear most of the time. If it does not drain early, it should be opened up freely. This should be done by a physician. At night, put into the ear two or three drops of a five per cent solution of phenol in glycerin. This will act as a poultice in bringing the infection to a head, and at the same time relieve some of the pain.

IMPACTED EARWAX (CERUMEN)

Impacted earwax is a very common source of trouble.

Causes: It is generally a result of disease of the middle ear, or of chronic catarrh of the nose and the throat. Sometimes it is caused by external irritants, such as picking in the canal, in an effort to cleanse it.

Treatment: If the mass is soft, syringing with warm water will quickly remove it; but if it is hard, considerable time will be required for removing it. Many people put oil in the ear, thinking that it will soften the wax. It will soften it, but it makes it more difficult to dissolve and wash out. If anything besides water is needed, a few drops of glycerin put into the

ear is very much better than oil. When water or oil is put into an ear that is filled with wax, the patient will be deafer for a time, because it causes the wax to swell and close the external auditory canal more tightly. This is one reason why many people become suddenly deaf while bathing.



IRRIGATING THE EAR

An ordinary enema outfit will do. Use a small rubber tip. Cleanse the entire outfit. The bag should be not more than one foot above the ear. A forceful flow might injure the eardrum. Place a towel around the patient's neck and shoulders, to protect the clothing. Let the patient hold the small irrigating basin just under the ear, the nurse directing the flow of warm solution into the ear. Do not push the rubber tip into the ear. The large basin on the stand is to receive the contents of the small basin when it becomes full.

Symptoms: The attack begins with pain in the ear, shooting over the side of the head. Chilly sensations and fever are sometimes present. The ear feels full, and there is ringing in the ear, and deafness. When perforation takes place, there is a sudden lessening of the pain.

When the wax is hard and of considerable quantity, the canal should be syringed with warm water for twenty minutes to one half hour every day until the mass is all dissolved and washed out. This can be done best by the use of a fountain syringe, with the container held about a foot above the head. Have the patient sit up with the head erect. Hold a bowl under the ear, and the water will run into the ear and out into the bowl.

GATHERING IN THE EAR

A gathering in the middle ear is an acute inflammation within the cavity of the middle ear, usually ending in the formation of pus.

Cause: It is generally a result of a cold extending from the nose and the throat through the Eustachian tube to the middle ear. Many times, the infection is forced into the ear by the pressure in the nose and the throat when the nose is blown. It occurs as a complication in attacks of scarlet fever, influenza, *et cetera*.

Inflammation of the mastoid is frequently a serious complication of this condition.

An infant affected with a gathering in the ear, cries constantly, turning its head from side to side, placing the hand frequently upon the affected ear. There is usually a fever, and sometimes there are convulsions. After the evacuation of the pus, all the symptoms quickly disappear.

Treatment: In the early stages of the disease, hot irrigation, hot fomentations (as hot as can be borne), or a hot water bottle, to the ear will give some relief. Put into the ear two or three drops of a five per cent solution of phenol (carbolic acid) in glycerin. This can be used three or four times a day.

Owing to the tendency of this condition to produce mastoiditis, and also rupturing, leaving a ragged condition of the drum, a physician should be consulted early, that the drum may be lanced as soon as it is seen to bulge, indicating pressure within the middle ear. This will save the tissues of the drum, and it will heal more rapidly. After the drum has ruptured, or has been lanced by a physician, the canal should be cleansed several times a day by gentle irrigation with a saturate solution of boric acid. The discharge should cease in a week or ten days.

MASTOIDITIS

This is an inflammation of the lining of the cells and antrum of the mastoid bone, usually ending in the formation of pus. The part of the mastoid bone that becomes affected is located just back of the ear. The condition begins with pain, which becomes intense in the mastoid bone, and extends to the whole side of the head. There is commonly redness and swelling behind the ear. It is tender to the touch, and tapping on the bone with the finger is very painful. There is usually some fever and general weakness. It is a very dangerous condition, and needs careful attention from a good physician.

Causes: Mastoiditis is in most instances caused by acute or chronic inflammation of the cavity of the middle ear. Sometimes it is attributable to syphilis, tuberculosis, or an abnormal condition of the system resulting from an injury. It is a common complication of scarlet fever and influenza.

Treatment: This condition needs the attention of a physician, for it is decidedly serious if not treated right. To lessen the pain and symptoms in general, put an ice pack over the mastoid bone just back of the ear, with a large fomentation over the same side of the head and face. A hot foot bath or a hip and leg pack is a good treatment to give at the same time that

the ice pack and the fomentations are used. (For all these home treatments, see chapter 10.) This treatment should not be substituted for the services of a physician. The disease requires a surgical operation for its complete recovery.

CHRONIC DISCHARGE OF THE MIDDLE EAR

This is a very troublesome and dangerous condition.

Causes: Chronic purulent discharge of the middle ear is caused, in most instances, by neglect or improper treatment of an acute gathering of the middle ear. The commonest fault in the treatment is improper opening of the drum, so that the pus does not all drain out. If the draining continues more than two weeks, the case should have careful attention from a physician who has given ear diseases special study. Tuberculosis and syphilis of the ear also may cause this condition, even to complete destruction of the drum, allowing the middle ear to become catarrhal from external irritation. The discharge is usually mucus, or mucus mixed with pus.

Treatment: In uncomplicated cases, the treatment consists in daily cleansing the interior of the ear. This can be done by irrigating the ear with a saturate solution of boric acid. In the great majority of cases, the services of a physician are required to remedy the condition.

RINGING IN THE EAR (TINNITUS)

This is a ringing or hissing sound heard in the ear. It is subject to great variations in degree. The head noises that people complain of are almost as numerous as the individuals affected—pulsating sounds, continuous sounds, sounds like the ringing of bells, music, buzzing of bees, and many other noises.

Causes: Chronic catarrh of the middle ear is the most frequent cause. Other causes are nervousness, high blood pressure, inflammation of the external auditory canal, foreign body in the ear, earwax, anæmia, reflex phenomenon due to irritation of the nose, the teeth, or the digestive tract, and certain drugs, such as quinine and the salicylates.

Treatment: Treatment directed at the cause is the only thing that gives relief from this condition.

FOREIGN BODY IN THE EAR

A worm may crawl into the baby's ear when he is lying on the lawn. It occasions much discomfort, but the baby cannot tell you what the trouble is. He may cry, however, and put his hand over the ear.

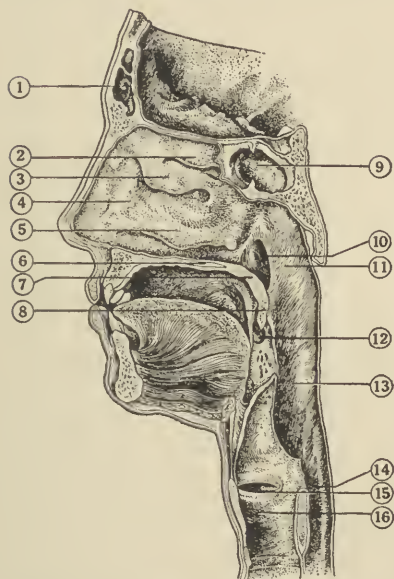
If an ant or a bug crawls into the ear, fill the external auditory canal with warm water, and the insect will come out. The ear may have maggots in it, as a result of a fly on the ear having been struck, and its egg bag burst, discharging the eggs in the ear, where they will hatch and develop. The best treatment would be to use a small quantity of chloroform on a piece of cotton held over the ear canal for fifteen minutes, after which the worms can be syringed out with warm water. A child may get a bean, a pea, a pebble, a button, or other small object into the canal. Such must be taken out with a small pair of tweezers or forceps. Care must be exercised not to injure the canal. If the foreign body is tight and beyond the small part of the canal, usually a physician should be consulted.

Diseases of the Nose

The nasal cavities are the commencement of the upper respiratory tract. They extend from the anterior nares to the posterior wall of the throat (the pharynx), and consist of two chambers, divided from each other by a partition (the septum).

The floor is separated from the roof of the mouth by comparatively thin structures, and hence is parallel to it. The roof is formed of bony structures. The lateral walls are bony structures, to which the three turbinate bodies are attached. The turbinate bones extend from the lateral walls, in toward the septum, and divide each nostril into three sections, called the superior, middle, and inferior meatuses, or openings.

Into these compartments open various ducts, connecting the nasal cavities with other cavities about the nose. The ducts that carry the tears away from the eye empty into the inferior meatus; the ducts from the cavity in the cheek bone (called the maxillary sinus) and from the frontal sinus, the cavity in the bone just back of the eyebrow, and the ethmoid cells in the bone of the roof of the back part of the nose, all open into the middle meatus; and the sphenoid sinus, located in the back



SECTION OF HEAD, SHOWING INNER SURFACE OF RIGHT HALF

- | | |
|----------------------------|--------------------------------|
| 1. Frontal sinus | 8. Uvula |
| 2. Superior turbinate bone | 9. Sphenoidal sinus |
| 3. Middle turbinate bone | 10. Orifice of Eustachian tube |
| 4. Nasal cavity | 11. Nasal pharynx |
| 5. Inferior turbinate bone | 12. Tonsil |
| 6. Bony palate | 13. Oral pharynx |
| 7. Soft palate | 14. Esophagus |
| | 15. Right vocal cord |
| | 16. Larynx |

part of the roof of the nose, opens just back of this. In a case of "cold in the head," the secretions that one blows from the nose come largely from these bony cavities.

The Eustachian tubes extend from the middle ear to the nose just opposite to the posterior end of the septum. When, for any

reason, they become elosed, the ear feels stuffy or full. The adenoids are located at the posterior end of the septum, on the roof of the pharynx, or throat, not in the nostril, but in the vault of the pharynx.

The mucous membrane, or lining, of the nose, is very thin in the upper part of the nose; but in the lower part, it is very thick, and contains large cavernous blood vessels embedded in loose cellular tissue. When these vessels become engorged with blood, the bulk of the membrane enormously increases, and may cause almost complete stoppage of the nasal chamber. This stoppage interferes with breathing through the nostrils, and is often experienced in the early stages of a "cold in the head."

In the vestibule, or anterior dilated opening of the nostril, are sweat and oil glands, and short hairs that serve to prevent the entrance of insects and coarse particles of dust into the nostril. The oil glands in this region often become infected and very sore. In the mucous membrane of the upper respiratory region, large numbers of mucous and serous glands are located.

In the upper part of the nose are located the nerve endings of the sense of smell. The lymphatics of the nose are numerous. These drain through the tonsils and the lymph glands of the neck. Hence the common inflammation of the tonsils and the glands in the neck when there is an infection or sore in the nose.

The functions of the nose are: first, the sense of smell; second, serving as a resonant cavity during vocalization, obstruction of the nasal chambers producing peculiar nasal intonation during speech; third (perhaps the most important function of the nose), warming, moistening, and freeing the inspired air from dust; and fourth, providing protection against disease-producing bacteria through the bacteria-destroying properties of the normal secretion of the nostrils, either destroying or inhibiting the growth of the bacteria. The practical point in this connection is to remember that irritating antiseptic sprays are often used to the detriment of the person using them. Only the milder washes should be used, and they should be used only when necessary to wash scabs, crusts, or putrid mucus from the nose. Many people bring on chronic catarrh by constantly spraying and washing the nasal chambers.

COLDS (CORYZA)

A "cold in the head," an affection of the nasal cavities, with sneezing and abundant discharge, and often extending to the throat, causing sore throat and coughing, and sometimes even involving the bronchial tubes, is so common an occurrence as to need no description.

Causes: Evidently various factors are responsible, and often several influences combine to cause a cold. Disease germs are always an essential factor, but usually they require favorable conditions in order to enter the tissues and produce their effects. Many colds are epidemic, affecting practically a whole community by contagion, including the strong as well as the weak. At other times, exposure to cold and wet, overwork, loss of sleep, or other exhausting conditions initiate the cold. In these cases, apparently the disease germs are already present in the nasal cavity, and loss of resistance in the tissues gives them their chance to begin their work.

It is common experience that a draft on the back of the neck or on the feet may act as the determining cause. Recent experiments have shown that, contrary to the old idea that such chilling of the skin caused a congestion, or increased amount of blood, in the nasal lining membrane, which was supposed to initiate the inflammatory process, such chilling of the body surface is always accompanied by a constriction of the small blood vessels in the nose. This lack of normal blood circulation is the condition which reduces the resistance and gives the cold-producing germs their chance.

Other predisposing factors are: lack of resistance from living in heated rooms, without sufficient outdoor exercise; lowered resistance due to errors in diet, including overeating, especially of concentrated food, such as sugar, fats, meats, and nuts, and other dietetic mistakes as enumerated in chapter 21; diseased tonsils and adenoids.

Treatment: The outcome is always favorable under proper treatment. If the treatment is incorrect, the cold may last for weeks or even months. It may be the starting point for other ills, which may destroy life.

If the patient has been on a regular diet, it should be very materially reduced or discontinued for a meal or two. If food is taken, dry cereals or fresh fruits that do not require the addition of sugar or cream would be best in most cases.

In case of a cold, the digestive tract should be emptied, even though the bowels have been moving freely. Give an enema, using from two to three quarts of water at a temperature of 102° F. Have this water retained for four or five minutes, then expelled. Next give two or three pints of water at a temperature of 80° or 85° F. Do not give the warm water if you do not intend to give the cool following. It will only increase the symptoms.

If the patient has a fever, he should go to bed; but if not, and he is physically strong, light exercise in the open air and sunshine is very valuable.

When the cold first comes on, a gentle sweating treatment is of value, such as a full blanket pack, a hip and leg pack, a hot foot and leg bath, or a hot tub bath. (See chapter 10.) This should be followed by a short cold friction or sponge bath or a cold pour. If such a hot, sweating treatment is taken, it is imperative that the patient go to bed in a warm bed immediately, and he must not expose himself by going outdoors after the treatment before going to bed. He should remain in bed at least overnight. It is much better not to take any hot treatment than to take the treatment and then go outdoors or about one's work. On getting up, the patient should again take a cold tonic bath.

To relieve the symptoms of the congestion in the head, simultaneous hot and cold to the head is excellent—cold to the back of the neck, and hot applications to the forehead and the face.

All drugs should be avoided in the treatment of a cold.

If a cold in the head is very severe, or hangs on long, it may cause infection of one or more of the bony air chambers (sinuses) that communicate with the nose. Infection of these sinuses (frontal, ethmoid, or antrum) may give rise to very distressing symptoms. These conditions are often falsely called neuralgia, migraine, and sometimes sun pain, because the pain occurs only at a certain time of the day and disappears at night. With these symptoms, there will be tenderness just over the eye, near the nose, or just below the prominence of the cheek bone. In case of such obscure symptoms, or a prolonged cold, a competent physician or specialist should be consulted.

SIMPLE CHRONIC CATARRH OF THE NOSE

This is a very common and troublesome disease, which generally lasts for years and sometimes through life. It is as widespread as civilization. Though it does not in itself cause many deaths, it does lay the foundation for many diseases. Catarrh is not due to the climate; it is not due to germs; but it is due to wrong habits of living. Although catarrh is usually brought on by digestive disturbances, it manifests itself in the mucous membranes. It may appear on any mucous membrane. It is the cause of many cases of deafness and roaring in the ears. It appears in the bronchial tubes as bronchitis, with chronic cough; in the stomach, producing gastritis, and so forth.

In chronic catarrh, the mucous membrane may either become thickened or it may be very thin (atrophied). In the beginning, the catarrh is commonly of the moist variety. Great quantities of mucus are poured out. This is noticed by the mucus dropping down the back of the throat, or blown out through the nose. The catarrh may turn into the dry variety; then crusts of dried mucus

form in the nose. Most of the children who have the disgusting habit of picking the nose are suffering of catarrh, and the mucous membrane has so degenerated that it is unable to keep itself clean. If catarrh is allowed to remain long, this mucous membrane is forced into degeneration. It cannot be overworked without being weakened. A weakened mucous membrane becomes an ideal site for many different kinds of disease, including consumption.

It is easy to rid the system of catarrh. It is surprisingly easy in the young. The average young person can get rid of catarrh in a few weeks. That is, all the symptoms will disappear in a short time; but it requires considerable time to build up the system so that the disease is really cured. Catarrh is always curable until it has caused extensive degeneration of the physical structures. Most cases are curable; and nearly every case can be helped, even if there is structural degeneration. Other causes of catarrh are wind, dust, smoke, excessive cold or heat, poisonous gases, impure air, alcohol, tobacco, obstruction in the nose, diseased tonsils or adenoids, frequent colds, influenza, hay fever, infections in the sinuses of the head, lack of exercise in the fresh air and sunshine.

Treatment: The first and most important thing to do, is to find the cause and remove it. In the great majority of cases, this is all that is necessary to bring about a complete cure. Nine tenths of all cases of catarrh are brought on by digestive disturbances,—either constipation, or abnormal fermentation in the stomach or the bowels.

It is best for one who has catarrh to refrain from drinking at mealtime, and for three quarters of an hour before meals and for two hours after eating; also to avoid sloppy foods. Drink water freely between meals, but take no food or drug drinks.

The minimum amount of free fats should be used, such as butter, vegetable fats, mayonnaise, rich gravies, and fat meat. Sweets should be used very sparingly, as they have a tendency to clog the system and produce auto-intoxication. Condiments and spices are catarrh producers and should be avoided.

Keep the bowels clean by using the natural cereals, as entire wheat bread, bran bread, natural or unpolished rice, whole corn meal bread, granose flakes, and fresh fruits and vegetables.

Keep the circulation and the muscles toned up by exercise in the fresh air and sunshine for at least two hours every day.

Have pure air day and night.

Keep the skin normal by taking a cool sponge bath or plunge once a day, followed by a thorough dry hand rub. Nasal washes and sprays only relieve the symptoms, and are many times the cause of catarrh. When a large amount of mucus or of scabs

collects in the nose, it can be washed out with a little warm water to which has been added a level teaspoonful of table salt to the pint of water. After washing the nostrils thus, it is well to spray into them some neutral mineral oil. This can be purchased from any pharmacy.

OBSTRUCTION OF THE NOSE

Causes: This may be due to one of several causes. Swelling of the lining membrane of the nose, resulting from chronic catarrh, is the most common cause. In case of a bad cold or chronic catarrh, the tissues become greatly swollen. Many people with chronic catarrh complain that when they lie down, the nostril swells shut on the side that they lie on, and that when they turn over, the other nostril closes and the former opens. The proper treatment is the cure of the catarrh.

Another frequent cause of obstruction of the nostril is hypertrophy, or permanent enlargement, of the mucous membrane of the nose and of the turbinate bodies. These bodies are normal structures and are very useful. The treatment should comprise removal of a part of them, so that the air can get through. This should be done only by a surgeon who makes a specialty of this class of work.

Nasal polypi comprise another form of obstruction of the nose. These polypi are tumors that usually form as the result of a chronic purulent infection in the sinuses of the head. They require the attention of a specialist.

Adenoids are not in the nose, as many people think, but are at the junction of the nose and the throat. When they become enlarged, the patient is unable to breathe through the nose. The adenoid is a normal structure, and should not be removed unless it causes obstruction to nasal breathing. Under this condition, it should be removed, that the child's development may not be retarded. Children that habitually breathe through the mouth generally have enlarged adenoids or chronic catarrh, or both. Neglect of these conditions is injury and injustice to the child.

Children sometimes get foreign bodies in the nose, such as beans, peas, buttons, or pebbles. If the tissues of the nose become sore and swollen, the foreign body will be very difficult to remove. Before this occurs, it often can be removed by blowing in the child's mouth, forcing the object out through the nostril. Otherwise the child should be taken to a physician.

NOSEBLEED

Causes: It can come from one or more of several causes. It may be due to some disease of the blood or of the blood vessels, or to high blood pressure. Ulcerations in the nose, usually at-

tributable to chronic catarrh of the nose, are the most frequent cause of nasal hemorrhage. It may also accompany conditions resulting from a fall or a blow, including fracture of the base of the skull.

Treatment: In most cases of spontaneous origin, the bleeding is from the front of the middle partition (the septum). This can usually be checked by gently closing the nostril between the thumb and the finger, or by applying a cold cloth to the face and the neck. Many times, the patient is seen bending over, letting the blood drip from the nose, or resting in bed, leaning over the edge of the bed, so as to allow the blood to drip into a receptacle upon the floor. This is not the right way. Have him sit up, with the head erect, and hold a bowl under the chin (not the nose) to catch the flow of blood. This change of position takes off pressure from the veins in the neck, and may be all that is necessary to stop the hemorrhage.



NOSEBLEED

To stop nosebleed, do not bend the patient's head down, as that would cause the blood to rush to the head with greater force. Hold the head upright, and let the blood drip into a bowl. Ice at the back of the neck helps also, and sometimes cold water running on the wrists. Note that the bowl is held under the chin, not immediately under the nose.

If it recurs frequently, the patient should be treated for the catarrhal condition, which is usually the cause. An ointment made by putting two and a half drams of gallic acid in one ounce of vaseline, applied in the nostril at bedtime, is good. If the trouble persists, you should see a physician. In case of severe hemorrhage, call a physician at once. Keep cold to the face

and the neck, and warm to the extremities. Hold the nose firmly between the thumb and the finger. If there is considerable blood running into the patient's throat, enough to endanger his life, hold a small roll of cotton or gauze firmly against the soft palate, pushing it firmly against the roof of the throat, until the physician arrives.

Section XIV—The Urinary System

CHAPTER 57

Physiology of the Urinary Organs

The urinary organs comprise the kidneys, the ureters, the bladder, and the urethra.

THE KIDNEYS

The kidneys are two bean-shaped organs that secrete the urine. They are placed in the upper and back part of the abdominal cavity, on either side of the vertebral column. They are outside and back of the peritoneum, the serous membrane that lines the abdominal cavity.

Each kidney presents on its inner border a depression called the hilus. Here the blood vessels and the nerves enter. The posterior surface is directed backward and inward, and rests on the muscles that form the posterior abdominal wall.

The anterior surface is covered by the abdominal organs. In front of the right kidney is the liver, the duodenum, and the colon, while the stomach, the pancreas, the spleen, and the colon lie in front of the left. The suprarenal glands fit like a cap over the upper end of each kidney.

The upper end of the kidney is about five and a half to six and a half inches above the level of the hip bone behind, while the lower end is about one and a half to two inches above the hip bone. The twelfth rib lies over the upper part of the kidney; and in disease of this organ, a sharp rap over the twelfth rib usually causes pain. In the female, the kidneys are a little lower than in the male; and in both sexes, the right one is lower than the left.

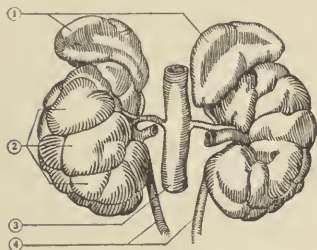
Support of the Kidney. Each kidney is embedded in fat, which is arranged in two layers. Immediately surrounding the kidney, a very thin layer of delicate fat forms a fatty capsule, or inclosing sac. Outside of this is found a large mass of fat, and this varies in amount according to the general body fat. A thin sheet of connective tissue called the renal fascia separates these two layers. This fascia is a part of the extraperitoneal tissue, and is attached to the diaphragm above.

Like all the abdominal organs, the kidneys are supported by the pressure exerted by the muscles of the anterior abdominal

wall. The renal vessels, being thick and short, also help to keep the kidneys in position.

Size and Weight. The size of the kidneys varies according to the size of the individual. Each kidney weighs four and a half to six ounces, and is four and a half inches long, two and a half inches wide, and one to one and a half inches thick.

External Appearance. The kidney is reddish brown in color, and may appear lobulated on the surface. Externally it has a thin capsule of connective tissue, which is easily torn from the kidney substance proper. At the hilus, the blood vessels and the nerves pass into the kidney. Here also the capsule of the kidney is connected with a funnel-like pouch, called the pelvis, and this narrows down to form the ureter.



From Sabotta and McMurrich

KIDNEYS

- | | |
|--------------------|------------|
| 1. Adrenal glands | 3. Aorta |
| 2. Lobes of kidney | 4. Ureters |

Internal Structure. If we cut a kidney into a front and a back half, we can get some idea of its internal structure. We find that it is divided into an outer and an inner part. The outer part, the cortex, is reddish brown in color, and averages about one third of an inch in thickness. This dips down toward the pelvis of the kidney, between bodies called, from their shape, the pyramids.

The inner or medullary portion is formed chiefly of a large number of tubules that extend from the cortex to the pelvis. These tubules are joined together, and with the intervening connective tissue, constitute the pyramids. The base of each of these pyramids is directed outward; and its apex projects into the pelvis of the kidney, and presents a large number of small openings, which are the outlets of urinary tubules.

In the cortex, the arteries divide and form small bunches or tufts of vessels called the glomeruli or renal corpuscles. A glomerulus is surrounded by a thin capsule, which is made up of two layers. The cavity between these two layers is continuous with the urinary tubules already mentioned. The tubules and the glomeruli are the seat of the secretion of the urine.

Blood and Nerve Supply. Each kidney receives a large artery from the abdominal aorta. This vessel divides into three to five branches at the pelvis of the kidney. Each one of these again subdivides and enters at the hilus, passing into the kidney substance between the pyramids, at the bases of which it forms

arches. From these arches, branches pass to the cortex and supply the renal corpuscles, while others pass inward to supply the pyramids. The veins run parallel with the arteries, and carry the blood in the opposite direction, and join to form the renal vein, which empties into the inferior vena cava. The kidneys receive their nerve supply from the solar plexus.

Function. The exact manner in which the urine is produced has been the subject of a great amount of study. The most recent investigation tends to show that the renal corpuscles separate from the blood most of its constituents (except albumin and sugar) by osmosis, and as this secretion passes down the urinary tubules, a certain part of it needed in the body is again absorbed into the blood stream, passing again into the general circulation.

THE URINE

The urine is an amber-colored fluid secreted by the kidneys.

How to Obtain a Sample for Examination. For a complete laboratory examination, the total amount of urine should be saved for twenty-four hours. It should be collected and kept in a glass jar that has been thoroughly cleaned with boiling water. The specimen of urine should be kept in a cool place, and it is best not kept more than twenty-four hours before being examined.

Characteristics of Normal Urine.

Color: Normal urine varies from a very light straw to a dark amber. If there is a large amount of urine, it is usually light-colored; and if small in amount, it is usually dark-colored.

Transparency: Normal freshly voided urine is always clear. Cloudiness of the urine may be caused by the presence of pus, urates, phosphates, and bacteria.

Pus causes a cloudiness that is present immediately after voiding and settles rapidly to the bottom if allowed to stand.

Urates of potassium, sodium, calcium, or magnesium, if present in large amounts, may cause a cloudiness of the urine. This cloudiness appears after the urine stands in the cold for several hours. The deposits may vary from a dirty yellow to a brick red color, and quickly settle to the bottom. Cloudiness due to urates quickly disappears if the urine is gently heated.

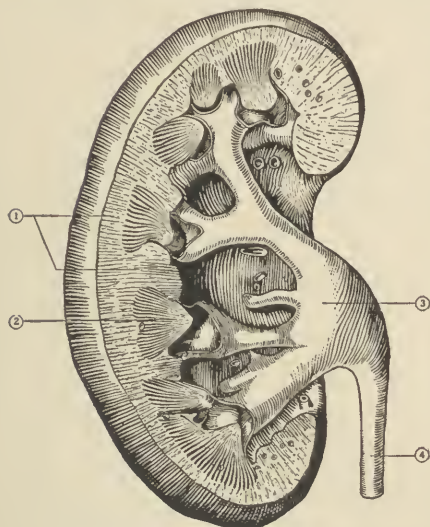
Phosphates cause turbidity, or muddiness, which is uniform throughout, and the turbidity disappears on the addition of acetic acid.

Bacteria cause a cloud that tends to float in the center of the vessel, and this cloud does not disappear on the addition of

acetic acid. It does not settle to the bottom, but tends to increase if the urine is allowed to stand for a time.

Odor: Freshly voided normal urine has a characteristic odor, sometimes called aromatic or urinous. On standing in a warm place, it decomposes, and then it has an ammoniacal odor. This ammoniacal odor is also present where the urine has remained too long in the bladder, and this occurs where there is an obstruction in the urinary tract, most commonly seen in the male where there are strictures of the urethra or prostatic enlargement. Certain foods and drugs also cause a peculiar odor in the urine.

Reaction: Normal urine is slightly acid in reaction. This is because of the presence of acid phosphates and certain organic acids. In noting this reaction, red and blue litmus paper may be used. Acid causes blue litmus to turn slightly red, and alkaline urine causes red litmus to turn slightly blue. Occasionally the same specimen will cause both reactions.



From Sabotta and McMurrich

CROSS SECTION OF KIDNEY

1. Outer part, or cortex
2. Inner part, or medullary substance (pyramid)
3. Pelvis
4. Ureter

Specific Gravity: Specific gravity depends on the amount of solid waste matter dissolved in the urine. If the solid waste products are dissolved in a large amount of fluid, the specific gravity will be low, and *vice versa*. The normal varies between 1.010 and 1.030. Any condition or disease that injures the kidney and prevents it from throwing off these waste products causes a low specific gravity; for example, chronic Bright's disease. In diabetes insipidus and hysteria also, there is a low specific gravity, due to the large output of urine. High specific gravity is seen in diabetes mellitus, because of the presence of sugar. It is also seen in acute fevers and after profuse perspiration.

Quantity: The average amount of urine for twenty-four hours is 1,200 to 1,600 c. c.—from 40 to 50 ounces. The normal

limit is from one and a half pints to one and a half quarts. A diminution of urine is caused by any condition in which there is a large output of fluid from the body other than the urine; for example, hemorrhage, perspiration, vomiting, diarrhea. It is also seen in heart disease, acute nephritis, and acute fevers. The amount of urine is increased by the intake of large amounts of fluid; also in diabetes, nervousness, hysteria, and after taking certain drugs.

COMPOSITION OF URINE

The chief constituents are as follows:

Urine	{	Water 95%	1,200 c. c.	
	{	Solids 5% (60 gms.)		
	{		Organic about 3.7%	{
	{		Inorganic about 1.3%	
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Sugar. Sugar is not present in normal urine, except possibly in very small amount, which is not shown by ordinary laboratory tests. It is seen in disease of the pancreas, the brain, the liver, the thyroid gland, after ingestion of large amounts of carbohydrates, and after using certain drugs.

Indican. Indican is a substance caused by putrefaction of protein in the alimentary tract, and is not present in appreciable amounts in normal urine.

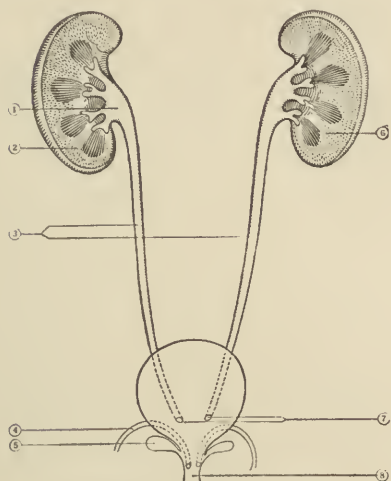
Casts. Under abnormal conditions, the tubules of the kidney may become filled with substances that harden and form a mold of the tube. Later these casts are washed out by the urine and may be seen by the use of a microscope. They are usually composed of pus, blood, epithelial cells, and fatty and coagulable substances from the blood. Their presence ordinarily indicates irritation or inflammation in the kidney tissue.

Calculi (stones). These are solid substances formed by the deposit of some of the salts of the urine. These vary in size from a grain of sand to the size of a walnut or larger.

Pus. In any inflammatory condition of the urinary tract or of organs connected with

it, white blood cells appear in the urine, and they are called pus.

Blood. Blood in the urine is called hamaturia. It is seen in cases of acute nephritis, tuberculosis of the kidney, cancer and other tumors of the kidney or bladder, and stone in kidney or bladder.



MALE URINARY SYSTEM

- | | |
|--------------------------|--|
| 1. Pelvis of kidney | 6. Left kidney |
| 2. Right kidney | 7. Opening of ureters into urinary bladder |
| 3. Ureters | 8. Urethra |
| 4. Right vas deferens | |
| 5. Right seminal vesicle | |

THE URETERS

The ureters are two small musculomembranous tubes that convey the urine from the kidneys to the bladder. The length varies from ten to twelve inches, and the diameter is about one fifth of an inch. Above, the ureters are formed by the narrowing down of the pelves of the kidneys. They pass down on the back abdominal wall behind the peritoneum. Passing over the

brim of the pelvis, they cross the pelvic floor, and terminate in the bladder by passing obliquely through its walls. There are three normal constrictions in the ureter; and at one of these points, stones commonly lodge in their passage from the kidney to the bladder. The upper constriction is about the level of the lower end of the kidney, where the pelvis joins the ureter. The second is where the ureter passes over the pelvic brim. The third is at the entrance to the bladder.

THE BLADDER

This is a musculomembranous sac that acts as a temporary reservoir for the urine. The base is directed backward against the rectum, and is triangular in shape. At the upper and outer angles of the base, the ureters enter the bladder. The neck of the bladder is surrounded by a constricting muscle, and rests upon the prostate gland in the male, and upon a strong sheet of connective tissue called the urogenital diaphragm in the female. This diaphragm stretches across between the pubic bones in front, and helps to form a part of the pelvic floor. The front lower surface of the bladder rests upon the pelvic floor, which is formed by the levator ani muscles. The upper surface is covered over by peritoneum. When the bladder is full, the superior surface is dome-shaped and directed up into the abdominal cavity; and when empty, it is concave. In the male, this surface is covered over by the coils of the small intestines; and in the female, by the body of the uterus.

Under ordinary conditions, the bladder will hold about a pint. If we examine the interior of the bladder when it is empty, we find that the wall is thrown into folds, except in the floor, where we have a triangular shaped area that is smooth. This is called the trigone. At the back and outer parts of the trigone are the openings of the ureters; while in front, the urethra leaves the bladder.

THE URETHRA

The urethra is a membranous tube by which urine is discharged from the bladder. In the male, it is divided for description into three parts,—prostatic, membranous, and penile. The prostatic part is about one inch in length, and passes through the substance of the prostate gland. Into the floor of this part there are the openings of the prostatic and ejaculatory ducts. The membranous part pierces the urogenital diaphragm, and is about one half inch in length. Between the two layers of this diaphragm, the urethra is surrounded by a sphincter muscle. This is the most constricted portion of the urethra. The penile portion is surrounded by the body of the penis.

Diseases of the Kidneys

ACUTE NEPHRITIS

Nephritis is an inflammation of the kidney substance. It is commonly known as Bright's disease. There are many varieties of this disease; but we will consider only the acute and the chronic.

Causes: Acute infectious diseases, such as smallpox, scarlet fever, typhoid fever, malaria, diphtheria, and measles, often result in inflammation of the kidneys. In fact, any of the pus microbe infections of the body may lead to this condition. Not infrequently it is caused by acute appendicitis. Some drugs will produce it. Carbolic acid, potassium chlorate, and turpentine are among the most dangerous. The use of potassium chlorate as a mouth wash for sore throat is hazardous because of the danger to the kidneys. In one instance, turpentine, taken to produce an abortion, caused such a violent inflammation of the kidneys that their function was entirely destroyed, and in five days, the patient's four beautiful daughters were motherless. Pregnancy is a frequent cause of acute nephritis. This is especially true in the last three months of pregnancy. Nephritis may come on suddenly and unexpectedly.

Symptoms: It is a very common idea that a lame back, or soreness in the back, means Bright's disease; but in the worse forms of Bright's disease, there is practically no pain in the back. One of the symptoms of acute inflammation of the kidneys is general dropsy, although the face and eyes only may be puffy. Children afflicted with this disease may have convulsions; but convulsions in children are by no means always caused by nephritis. Headaches, nausea, and vomiting are other symptoms. A very severe headache may be the first warning of impending convulsions in a pregnant woman. There may be fever and great weakness. The changes in the urine are very characteristic and important. These changes can only be determined by a well qualified physician. The urine is scanty, high-colored, smoky, or even bloody. Albumin is present. Pus, blood, and casts are made manifest by the microscope. Casts are portions of the fine tubes in the kidneys which are destroyed by the inflammation and thrown off in the urine.

Acute inflammation of the kidneys may terminate in a complete cure, and the kidneys be restored to quite their normal condition; or it may gradually develop into a chronic form of the disease, lasting over a period of several years before a fatal

termination. In other cases, it may in a few days produce death. It is especially fatal following scarlet fever.

Treatment: Acute nephritis demands the attention of a competent physician. Drug medication is of no value. A patient suffering of any of the acute infectious diseases should avoid exposure and cold. Rest in bed and large quantities of water should be taken. Hot baths and packs are useful. The nephritis accompanying appendicitis is avoided and best treated by early surgical treatment of the appendix. Careful watching on the part of a trustworthy physician will avoid serious kidney difficulty in a pregnant woman. She should place herself under the care of a physician as early as the third or fourth month of her pregnancy. By so doing, she will very largely avoid kidney complications. Too often the expectant mother relies upon some midwife, or delays to call a physician until she is in labor. Severe headaches, swelling of the face and hands, nausea, and vomiting are disregarded until convulsions occur and the woman dies, or the kidneys are more or less permanently damaged. The diet in nephritis should be as near as possible an exclusive milk diet.

CHRONIC NEPHRITIS

Causes: Chronic nephritis may result from an acute nephritis that does not go on to recovery, or it may come on insidiously from a low-grade infection of long standing, or a low-grade irritation from chemical irritants taken for a considerable period of time. Alcohol is a common cause of chronic Bright's disease. The damage done to the kidneys in the convulsions of pregnancy is often permanent and progressive.

Symptoms: The symptoms of chronic Bright's disease in many cases are indefinite. The sufferer is unaware of any serious kidney affliction. The accidental discovery of a high blood pressure may be the first intimation of kidney disability. Not infrequently do patients present themselves for examination and find that they have a blood pressure nearly double the normal. Headaches, loss of weight, weakness, shortness of breath, and failing eyesight are common indications of chronic Bright's disease. The urine findings are not so characteristic as in the acute stage of the disease. There is a large quantity of light-colored urine, with a low specific gravity. (See chapter 57.) There may be no albumin, and only an occasional cast. Any individual who is passing more than two quarts of urine in twenty-four hours should have a physician's examination to determine if chronic Bright's disease is present.

This ailment eventually results fatally. It may run a course of from two to twenty years. The cause of death is one of three

things: uræmia, apoplexy, or heart failure. Uræmia is due to the poisoning that takes place in the blood from retained substances that the damaged kidneys have failed to throw off. The uræmia manifests itself in two different ways,—convulsions and coma. In coma, the patient becomes more or less stupid, goes to sleep, and quietly passes away. The apoplexy is caused by the bursting of a blood vessel in the brain, the blood vessel not being able to stand the extra high blood pressure that the chronic Bright's disease produces. The heart failure may come on suddenly following some severe physical strain, or more generally the heart gets tired from pumping blood under high pressure. Dropsy of the feet, ankles, and legs may follow this weakness of the heart; also great shortness of breath, and asthma. The final illness of chronic Bright's disease may last a year or more.

Treatment: Prominent factors in the treatment of this disease are good hygiene, diet, and appropriate rest and exercise. A person who is suffering of chronic Bright's disease should avoid cold and exposure. Mental and physical strains should be reduced to a minimum. He should have an abundance of rest, fresh air, and warm bathing—not hot. A bath for thirty minutes every night at ninety-seven or ninety-eight degrees is of great value. The drinking of plenty of water is important. Tea, coffee, and meats should be entirely avoided. The dairy products are the center around which the diet may be built up. Eggs may be used sparingly. Grains and fruits are permissible. The bowels must be kept open and free, by the use of some laxative, if necessary, such as paraffin oil. A physician should be consulted at regular intervals, to direct the habits of life.

PYELITIS

Pyelitis is an inflammation of the pelvis of the kidney. The pelvis of the kidney is the enlarged upper end of the ureter, the tube that conveys the urine from the kidney to the bladder. It receives the urine from all parts of the kidney through the little tubes that empty into it.

Causes: Inflammation of the pelvis is generally attributable to the infection of pus microbes as they are eliminated from the blood stream passing through the kidney, or such microbes passing upward from a diseased bladder. Infected tonsils or infected teeth may be the original source of the invading microbes. Any of the pus microbes may cause pyelitis. One of the most common and persistent is the colon bacillus, which is always found in the large intestine. Colon bacilli will remain in the pelvis of the kidney for years. Much of the time, they may be more or less dormant; but on other occasions, they cause very severe symptoms.

Symptoms: The symptoms of pyelitis may be slight, a tendency to frequent voiding of urine being the only complaint. At other times, the inflammation is so great that there is a constant, painful desire to void. There may be heavy chills and high fever, with extreme prostration for days at a time. The symptoms may be entirely confined to the bladder. Indeed, the majority of people who have pyelitis believe that they have inflammation of the bladder. Many have been treated for inflammation of the bladder, and even had the bladder washed, when the trouble was in the kidneys, a long distance from the bladder.

Microscopic examination of the urine will show pus and possibly blood. An accurate diagnosis of pyelitis can only be made by a very careful examination of the urine and the use of the cystoscope. With this instrument, the urine can be collected from each kidney separately. This examination requires the skill of a specially trained physician. Comparatively few physicians are competent to make this examination accurately. The cystoscope is a hollow instrument with a small electric light and a mirror at its tip. This instrument is inserted into the bladder, and very small, especially designed rubber tubes are inserted into the ureters from the bladder. Thus the urine is collected from each kidney. It can be examined for pus and blood. Oftentimes only one kidney has pyelitis. The germs of the urine can be cultured, and thus the actual kind of germ causing the pyelitis can be determined. This form of diagnosis calls for the very highest skill of a specialist. The X ray also may be needed to clear up some points of doubt. There is no other way to make an absolute diagnosis of pyelitis, than that here outlined.

Treatment: Pyelitis is a condition that is compatible with life quite indefinitely. It very seldom results fatally. Yet it is a focus of infection which should be cleared up. Much water-drinking is of great value. The specialist sometimes makes a vaccine from the cultivated germs causing the pyelitis, and through a series of vaccinations, raises the patient's resistance until the disease is cured. Sometimes the specialist is obliged to inject antiseptics into the pelvis of the kidney, to destroy the infection. Abscessed teeth, tonsils, or other sources of infection should receive appropriate attention.

FLOATING KIDNEY

Unlike most of the organs of the abdomen, the kidneys have no well defined ligaments to hold them in place. They are always more or less movable. They lie wholly behind the peritoneum, which lines the entire abdominal cavity, and covers all the organs

in the abdomen. The peritoneum also acts as the chief ligament to hold the stomach, the intestines, the spleen, *et cetera*, in position. The kidneys have no such support. They are located in a large, long, ill defined cavity between the backbone and the sides of the ribs, where they lie insecurely upon a shallow, sloping shelf formed by the pelvic bones. They are surrounded by a loose layer of fat. The pressure of the abdominal viscera from the front has a tendency to hold the kidneys to the back. The large arteries and the large veins to the kidneys have very little function in holding these organs in place. The pelvis in women being broader and shallower than in men, the kidneys do not have quite as deep a pocket in which to lie. Hence we oftener find movable and floating kidneys in women than in men. Those who have been in good flesh, and for some reason have lost much in weight, are likely to be subjects of floating kidney.

Symptoms: The symptoms of floating kidney are very indefinite. In fact, most of these cases have no symptoms, and need no treatment. Not infrequently a woman discovers a lump in her side and wonders what it is. This mass may be pushed into almost any part of the abdomen, without pain.

A generation or so ago floating kidney was regarded as a serious disability. In recent years, the authorities are of the opinion that floating kidney of itself is of little moment, and is not dangerous or disagreeable. There are occasional floating kidneys which do give rise to quite grave disturbance. If there is an unusual arrangement of the vessels of the kidney as related to the ureter, it may cause a sharp kink in the ureter, thus obstructing that organ. This will produce the severest kind of pain in the kidney. An obstruction of the ureter will also occasion very agonizing, crampy pains in the side and the back, and may lead to vomiting. These symptoms, however, are relatively very rare in floating kidney.

Treatment: The treatment for this condition, in most instances, is to "forget it." Fifteen or twenty years ago many devices for holding the kidney in place were advocated. No such applications are efficient. The benefit that most people derived from wearing those pads was a mental cure of imaginary distress. Surgical authorities rarely perform operation for floating kidney. In one published list of ten thousand operations, nearly three hundred of them on the kidneys, there was not one operation for floating kidney. Rest in bed and forced feeding have been advocated by some. Of course, the rest and the general fattening will make the patients feel better, and they will be relieved of the distresses that were due to overwork and a "run-down" condition. A floating kidney that needs any attention

whatever will require surgery, and probably not one case in hundreds is serious enough to justify operation. In the majority of instances, the discovery of a floating kidney is unimportant, and should be disregarded.

TUMORS

Tumors of the kidney are occasionally found. Most of these are cancerous in nature. They occur at all ages. Infants and young children may develop a rapidly fatal cancer of the kidney.

Symptoms: These tumors come on insidiously. Bloody urine may be an early symptom. The appearance of blood in the urine is an urgent indication that a specialist on diseases of the genito-urinary tract should be consulted, because only by examination at the hands of a physician especially trained along these lines is it possible to determine the early presence of tumors in the kidney. The X ray is useful in determining the condition early.

Treatment: The treatment of tumors of the kidneys is surgical.

CYSTS

Cysts are sacs filled with fluid other than pus. Single cysts may occur in one kidney, but these are generally unimportant. There is a form of cystic disease of the kidney in which both kidneys are involved. This condition is present from birth, and slowly progresses over a period of many years. The kidneys eventually become very large, weighing ten or fifteen pounds each. The victims of congenital cystic kidney may live to be fifty or sixty years of age.

Medical and dietetic treatment is of no avail. Only rarely can surgery give relief. Neither kidney should be removed.

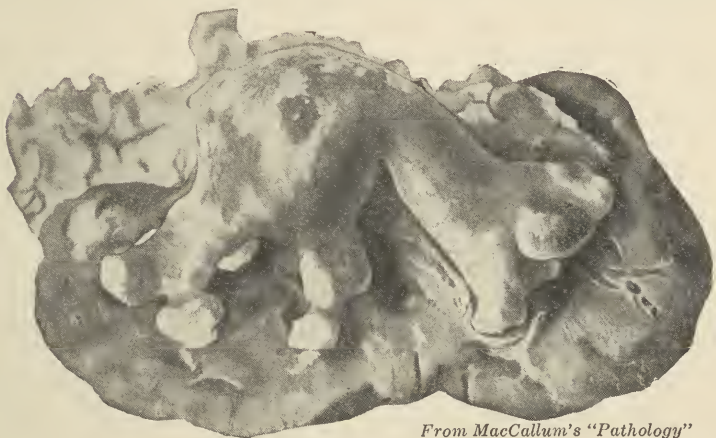
STONES IN THE KIDNEY

Stones in the kidney are of comparatively common occurrence.

Causes: The cause of these stones is primarily an infection in the kidney, such as pyelitis. This infection results in changes in the urine. The various salts of the urine are thrown out of solution and form the beginning of a stone. The stones may be single or multiple. They occur in one or both kidneys. If they are very small, they pass down the ureter with more or less distress, and are voided from the bladder. This is probably the fate of most kidney stones. If a stone remains in the pelvis of the kidney, it will increase in size indefinitely. Some are found as large as a hen's egg. At times, they make a complete mold of the pelvis of the kidney—irregular in shape. Stones may lie unsuspected in the kidney for years. A stone in the kidney which does not pass through the ureter, and is not removed, finally destroys the kidney. The infection—pyelitis—first

starts the stone, then the presence of the stone keeps up the pyelitis until the kidney is entirely destroyed. The drinking of hard water possibly favors the forming of stones in the kidney.

Symptoms: The symptoms of stones in the kidney may be very trifling. Indeed, the kidney may be quite destroyed before the victim has sufficient symptoms to drive him to a physician. Still, with stone in the kidney, there is almost always indication of its presence. Usually there is frequency of urination, particu-



From MacCallum's "Pathology"
Branched Stone in a Diseased Kidney

larly upon exertion, or upon riding over rough roads. If the stone tries to pass out of the ureter, the pain is sudden, severe, and excruciating, especially if the stone has sharp prongs, or is too large to pass down the ureter readily. The passing of a kidney stone is productive of one of the most intense pains to which human flesh is heir. The pain may be in the back or down the side, but more generally it is through the abdomen, and it often shoots down to the bladder and the urethra. This pain may last from a few minutes to several hours or days. There is a frequent desire to void during these attacks. In fact, the distress may be so closely confined to the bladder and its functions, that the patient and his physician are deceived into thinking that the bladder is primarily at fault.

The pain of the passage of stone comes on suddenly, and the relief may be sudden. The urine contains pus and blood. The stone may be too large even to enter the ureter, and remains in the pelvis of the kidney. The symptoms of this are indefinite pains through the back and the side, soreness through the side, and more or less frequency and urgency in emptying the bladder.

A stone in the pelvis of the kidney may block the ureter and cause great pain. There may be chills and high fever. The pain from kidney stone may be felt on the opposite side from the kidney containing the stone, although this is not common.

Stones in both kidneys at the same time produce a serious condition. A stone in one side may have quite destroyed the function of one kidney, while the other kidney may be rendered useless by a stone stuck in its ureter. This will cause uræmia. Not infrequently a person has only one functioning kidney. Obviously a stone in that one kidney causes a gloomy outlook. Here again the specialist on genitourinary work is demanded for an accurate diagnosis. The urine from the bladder and from both kidneys must be separately collected by means of the cystoscope and catheterization of the ureters. A careful X ray examination with leaded catheters in place must be made of both kidneys, the ureters, and the bladder. By this means, eighty or ninety per cent of all stones will be shown. This is quite the opposite from stones in the gall bladder, where about ten per cent of them will show a shadow. The X ray examination for stone in the kidney should be made by an expert; otherwise substances outside of the kidney and the ureter may cast shadows that are mistaken for stones in the urinary tract. In the hands of well qualified genitourinary and X ray specialists, stones in the kidneys or in the ureters, and their number, size, shape, and position, are very accurately determined.

Treatment: No medicine that can be taken by mouth will dissolve these stones in the kidney. Drinking a large amount of distilled or soft water may have a tendency to wash out the small stones. Most stones pass out before they become large enough to obstruct the ureter seriously; but when a stone as shown by the X ray is too large to pass the ureter, or is lodged in the ureter, its surgical removal is imperative. Surgery of this character, in competent hands, is safe and satisfactory to patient and surgeon. The presence of stones in both kidneys makes the operation more serious, but none the less urgent. In the majority of instances, the stone can be removed and the kidney saved. Occasionally the kidney is wholly destroyed, and its entire removal is then indicated.

After the removal of stones from the kidney and the ureter, the patient should habitually drink large quantities of distilled or soft water.

The treatment outlined under the subject of "Pyelitis," in this chapter, should be thoroughly instituted. Otherwise there is a possibility that other stones may be formed.

For tuberculosis of the kidneys, see chapter 46.

Diseases of the Bladder

CYSTITIS

Cystitis is an inflammation of the bladder, the active cause of which is generally an infection. Primary and uncomplicated inflammation of the bladder is a rare disease. The majority of the so-called inflammations of the bladder are due to troubles above the bladder, such as pyelitis, stones, tumors, and tuberculosis of the kidney. Not infrequently is the bladder accused of and treated for cystitis for long periods, while the trouble is nearly half a yard away, in one or both of the kidneys. The bladder has been washed out for months for cystitis when a stone in the kidney or a tuberculous kidney was responsible for the bladder symptoms. It is probable that primary disease of the kidney is fifty times more common than cystitis.

Causes: An inflammation of the bladder may be secondary to a pyelitis. Tuberculous kidneys always cause a tuberculous cystitis. The drawing of the water by catheter, even if the utmost care is taken to be surgically clean, often results in cystitis. Repeated catheterization of the bladder is likely to produce an inflammation of the bladder. Cystitis will follow obstruction of the urethra, such as strictures or enlarged prostate in the male.

Symptoms: The symptoms of cystitis are frequent, burning urination, with pus and possibly blood in the urine. The victim may have a constant desire to empty the bladder, and may make attempts every five or ten minutes. Simple, uncomplicated cystitis will get well in the course of a week or two. Cystitis from stricture of the urethra may persist indefinitely, and its cure is only possible when the obstruction is removed. Tuberculous cystitis is one of the most distressing and obstinate inflammations of the bladder. It is always secondary to tuberculous kidney. Severe cases of tuberculous cystitis will cause voiding every ten or fifteen minutes day and night. The burning and frequency are almost unbearable. Its victims are objects of sincere pity.

Examination of the urine will reveal pus, and many times blood. For an accurate diagnosis, the cystoscope is required. In no other way can an absolute diagnosis of cystitis be made. Without the cystoscope, the diagnosis is in doubt, and the treatment is in the dark.

Treatment: The indications for treatment of simple cystitis are rest in bed, exclusive milk diet, and much water-drinking. Alkalies and urinary antiseptics may be administered by the physician. Hot applications over the bladder and the hot sitz bath sometimes give relief. Tuberculous cystitis demands removal of the tuberculous kidney, and a statement to the patient that he may expect more or less "bladder trouble" for one or two years.

Cystitis caused by a stone that has formed in the bladder, or that has passed from the kidney to the bladder and failed to escape through the urethra, will occasion distress until the stone is removed. Cystitis due to stricture in the urethra from scar contraction will likely persist until the stricture is entirely cured. A cystitis that complicates an enlarged prostate in an old man will not recover until the prostatic obstruction is overcome. Washing the bladder is a procedure that is sometimes necessary, but should be done only by a competent physician or by a nurse who is trained in all the details of surgical technique. In brief, the treatment of cystitis is generally the treatment of its causes above or below the bladder.

TUMORS

Tumors of the bladder are uncommon. Cancer is probably the most common bladder tumor, and this is often secondary to cancer of the prostate in men, and cancer of the womb in women. Non-cancerous tumors of the bladder are occasionally found. Among these is the papilloma, which may be single or in great numbers. Frequently the papillomata become cancerous in character as their growth progresses.

Symptoms: The symptoms of tumor of the bladder are disturbance of urination, and bloody urine. Hemorrhages from the bladder may be very severe, even to the point of threatening life from loss of blood. An absolute diagnosis requires the use of the cystoscope.

Treatment: The treatment of tumors of the bladder is surgical. Nothing can be done for cancer of the bladder unless the disease is recognized very early. Portions of the bladder, or the entire bladder, may be removed for early cancerous disease. The non-cancerous tumors should all be removed early—either cut or burned off. The papillomata have a tendency to recur. One or two may become replaced by a dozen within a few months, and these in turn by many more. They are dangerous because of constant bleeding. The entire bladder has been removed for some of these tumors, and the patient survived the operation,

living in comparative comfort until some other condition destroyed his life.

STONES IN THE BLADDER

Stones in the bladder are comparatively frequent, much more so in men than in women. The short, large urethra in women favors the escape of stones that would be retained in men. Stones in the bladder may be single or multiple. They may be small or very large—goose egg in size. They are always preceded by inflammation of the urinary tract. Many bladder stones originally came from the kidney; but they may form in the bladder primarily. Inflammation of the bladder, with a partial obstruction of the urethra, favors the formation of bladder stones. These stones may occur in children or at any age. A small stone may cause even more disturbance than a large one.



Bladder Stone

Symptoms: The symptoms are frequent and possibly painful urination. A small stone may fall into the mouth of the urethra during urination, causing a sudden stoppage, with pain. Victims of this class of stones instinctively get the habit of passing their urine leaning forward, so that gravity will have a tendency to roll the stone away from the mouth of the urethra. The microscope will reveal pus and possibly blood in the urine. The X ray will show most stones of the bladder. The cystoscope will reveal their size, shape, and number.

Treatment: No medicine taken by mouth will dissolve the stones. In certain cases, instruments may be inserted into the bladder, and the stones crushed and their fragments washed out. Most of them require the opening of the bladder for their removal. This operation has been performed for centuries. Some of the most skillful work of surgeons in the past has been done for stones in the bladder. Indications are to remove the stone as soon as it is found; for left alone, it will increase in size, maintain the infection, and become a real menace to life as well as to happiness.

INCONTINENCE

Incontinence is a complaint that is relatively common and is amenable to treatment in many cases. In women, it is frequently due to injuries sustained in childbirth. The sphincter muscle has lost its tone, the whole supporting framework is relaxed, and the dribbling of urine is the result. Surgery is the only hope in these cases.

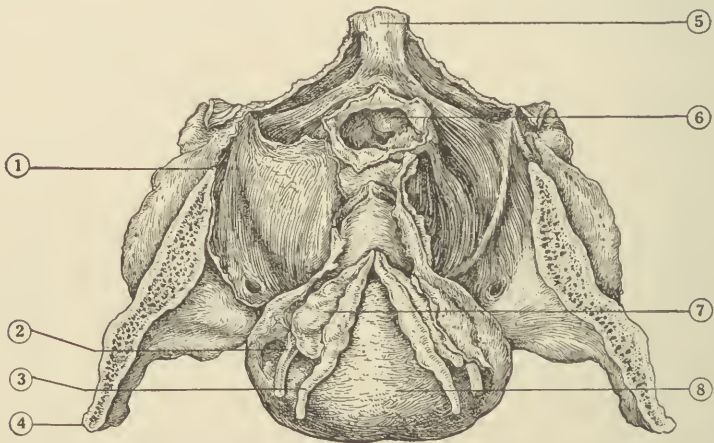
Sometimes a gaping of the internal sphincter comes on about the age of forty, from no apparent cause. The patient notes

that on exertion, a few drops of urine are occasionally passed. She grows progressively worse until at last a little urine escapes every time she coughs, laughs, or sneezes. This condition may be helped medically; and if not, surgical interference will bring relief.

The most common cause of the condition in men is an enlarged prostate. The gland prevents the proper emptying of the bladder; and with the organ overdistended, a more or less constant dribbling is experienced. This also is essentially a surgical case.

Incontinence is frequently seen in certain diseases of the nervous system—locomotor ataxia, softening of the brain, or paresis, transverse myelitis, and tuberculosis of the spine. The treatment must be aimed at the cause in these cases.

The difficulty is also observed in hysterics and psychasthenics. In such cases, psychology plays an important rôle in successful treatment.



Structures in the male pelvis, seen from above. The bladder is tilted forward to expose the structures on its under surface.

- | | |
|---------------------------------------|----------------------------------|
| 1. Posterior border of the iliac bone | 5. Lower end of vertebral column |
| 2. Ureter coming from kidney | 6. Rectum |
| 3. Vas deferens coming from testicles | 7. Seminal vesicle |
| 4. Front border of iliac bone | 8. Bladder; under surface |

Section XV — The Reproductive System

CHAPTER 60

Diseases of the Male Organs

HYDROCELE

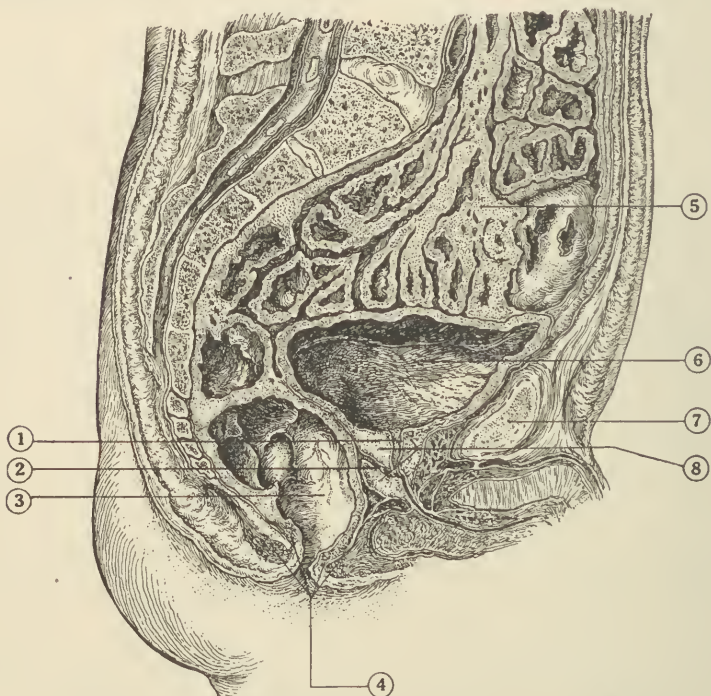
Hydrocele is an accumulation of serous fluid in the sac around the testicles, called the tunica vaginalis. This condition is quite common, and occurs in all ages, but oftenest after middle life. It is caused by some irritation of mild character in the lining of the tunica vaginalis. The fluid is straw-colored. The hydrocele varies greatly in size, from a small, insignificant sac, to one larger than two fists. The tendency is, to increase in size slowly but gradually. There is very little or no pain connected with the presence of hydrocele. It is annoying mainly because of its large size.

Treatment: The treatment is entirely surgical, and should be in the hands of a physician. A small hydrocele that is causing no inconvenience may be disregarded. Sooner or later, however, the majority require attention because of their bulk.

VARICOCELE

Varicocele is a dilation of the veins that carry the blood from the testicle to the large veins of the abdomen. It is a very common condition. Indeed, practically every man has a varicocele on the left side. The right side is much less frequently affected. This is due to the fact that the veins from the left testicle go up to the veins of the left kidney, the blood of which must cross over to the right side of the body to the vena cava; whereas the veins from the right testicle go directly into the vena cava some distance below the veins of the right kidney. Because the return blood from the left side must make this long, roundabout return journey, the veins on the left side are almost universally dilated. Yet only rarely do these veins become large enough to make trouble. Varicocele is a condition that quacks and advertisers frequently make use of to frighten people into using their remedies. They even go so far as to attribute constitutional diseases to the presence of varicocele.

The symptoms of varicocele are almost wholly imaginary. Possibly it may sometimes cause slight weight and dragging pain on the left side, but it does not shorten life, nor cause any serious disturbance of bodily function. Many surgical operations have been performed to tie off the dilated veins; but very,



PELVIC AND LOWER ABDOMINAL CAVITY IN THE MALE

- | | |
|---------------------------|--------------------|
| 1. Urethra | 5. Intestines |
| 2. Ejaculatory duct | 6. Urinary bladder |
| 3. Rectum, or lower bowel | 7. Pubic bone |
| 4. Sphincter ani muscles | 8. Prostate gland |

very rarely is this necessary. A suspensory is all that is needed to relieve a slight weight and heaviness of which some complain. For varicocele, the principal direction is, to "forget it."

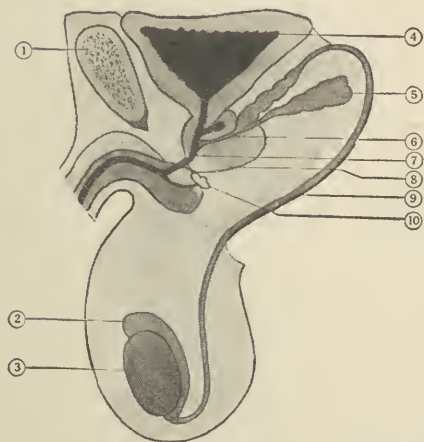
PROSTATIC ENLARGEMENT

Enlargements of the prostate gland are due to tumors forming in the gland itself. These tumors do not come in men until after the age of fifty years. They are then a quite common affliction. They are analogous to fibroid tumors in the womb in

women. Tumors in the prostate may be single or multiple. This gland is situated around the neck of the bladder, and the first part of the urethra goes through it. The enlarged prostate causes trouble principally by encroaching upon the caliber of the urethra, thus interfering with the emptying of the bladder. The cause of the tumors is entirely unknown. Their growth is rather

slow. Enlargements of the prostate are very likely to become cancerous in nature.

Symptoms: A man suffering of this ailment will generally first notice that he has to get up once or twice at night to void urine. The stream will be small and a little slow to start. A long time is required to empty the bladder; and toward the end of urination, the urine may dribble. This condition may continue for years without much change, but on the whole gradually growing worse. Should the patient take cold, it may become decidedly worse. Many elderly men will have no further disturbance than this. Others get progressively worse until they



MALE REPRODUCTIVE ORGANS

- | | |
|--------------------|--------------------------|
| 1. Pubic bone | 6. Ejaculatory duct |
| 2. Epididymis | 7. Urethra |
| 3. Testis | 8. Prostate glands |
| 4. Bladder | 9. Vas deferens |
| 5. Seminal vesicle | 10. Bulbo-urethral gland |

are unable to empty the bladder, and are obliged to resort to the catheter to obtain relief. A bladder acutely distended because of inability to pass the urine is very distressing. After the urine has once been drawn by catheter, the likelihood of infection of the bladder is very great. When the bladder becomes infected, the situation is painful indeed, and makes life almost unendurable. In this condition, there is an almost constant desire to pass the urine, and the attempts are agonizing. Chills, fever, great loss in weight, and a miserable premature fatal issue follow the infection of a bladder from a prostatic obstruction. Enlargement of the prostate is one of the tragedies of life. It comes on at a period when most men have done their life's work and are ready to enjoy the fruits of their labors. It comes at a time when all the world would be willing to give them a quiet, peaceful, comfortable existence. But the enlarged prostate all

too often dispels this peaceful dream, and their declining years are made a period of misery instead of comfort. Frequently they say they would prefer death to living with the discomfort they are experiencing.

The enlargement of the prostate can be determined by the physician examining through the rectum. Here again the cystoscope gives us much information.

Treatment: The only effectual treatment of the enlarged prostate is surgical. Medicine does no good. Mild cases get along without active surgical treatment, provided they are under observation. Modern surgery has dissipated many of the terrors of this disease. The tendency of the enlarged gland to become cancerous should be borne in mind. When this occurs, the prospect is quite hopeless. Its victims may live for several years in misery before death comes to their relief. Ninety per cent of the victims of enlarged prostate can be saved to enjoy a good degree of health and bodily function. However, in order that these ends may be attained, the case needs attention before the onset of cancer, and before the bladder and the kidneys are hopelessly affected. When the urine has to be drawn by catheter, we have a positive indication for surgery.

IMPOTENCE AND STERILITY

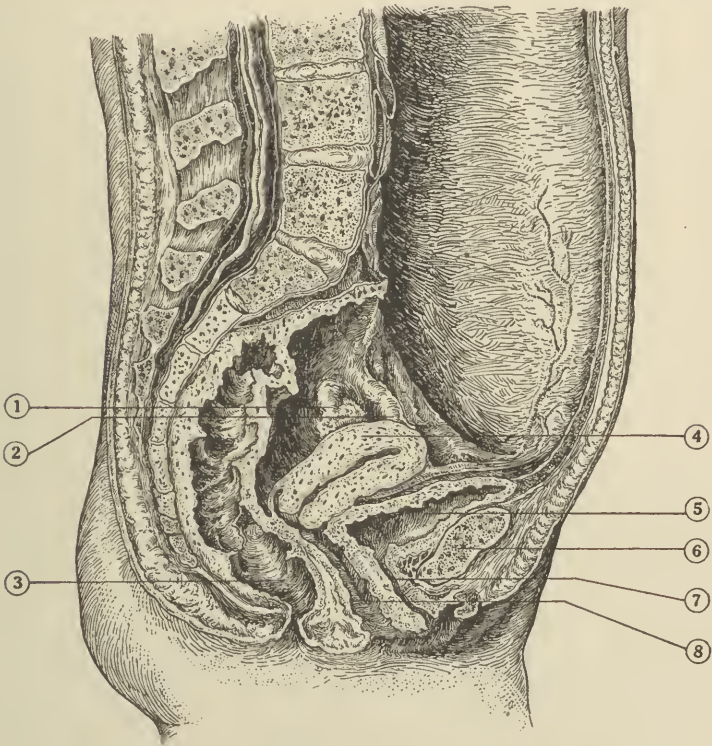
Causes: Impotence and sterility are usually results of some organic disease of the spinal cord, progressive wasting disease, or old age. Excessive sexual indulgence may produce premature impotence and sterility. A common cause of this condition is gonorrheal infection of the testicles. Sterility due to gonorrheal infection is permanent, except in rare instances. Inflammation of the testicle from mumps is not necessarily followed by sterility.

Treatment: Much has been written in the lay press of late on so-called interstitial glands; that is, planting under the skin the testicles of goats and other animals. The results are uncertain, and probably only temporary. In the present light of science, it is not a procedure that is to be generally recommended.

Diseases of the Female Organs

THE UTERUS

The uterus, or womb, is a strong muscular bag located in the pelvic cavity, between the bladder and the rectum. It projects upward into the lower part of the abdomen. It is shaped like an inverted pear. The uterus is freely movable, and may be pushed backward by a full bladder or forward by a distended rectum. The lower part of the uterus, or what corresponds to the neck of the pear, is called the cervix, or neck, of the womb.



PELVIS AND LOWER ABDOMINAL CAVITY IN THE FEMALE

1. Ovary
2. Fallopian tube
3. Rectum, or lower bowel
4. Womb, or uterus

5. Urinary bladder
6. Pelvic bone
7. Urethra
8. Vagina

The uterus has a central cavity, which is lined with mucous membrane continuous with the mucous membrane of the vagina; thus its connection with the outside world. The uterine cavity communicates directly with the Fallopian tubes, the mucous lining of one being continuous with that of the other, and is in this way directly connected with the abdominal or peritoneal cavity. This open passageway into the peritoneal cavity explains the greater frequency of peritonitis in women than in men.

The size of the uterus differs at different ages. In the adult woman, it is about three inches long, and about two inches at its widest diameter. Its width lessens at the cervix. It weighs about two ounces. During pregnancy, it weighs more. During the change of life, or at the menopause, there is a marked wasting of all the genital organs.

DISPLACEMENTS OF THE UTERUS

The uterus is held in position by ligaments, or cords, by the supporting tissues below, by the muscles between the vagina and the rectum, by the tension in the abdominal cavity, and by the fat found in the tissues of the pelvis. When the uterus is moved beyond the normal range of motion, and remains there, we call this a displacement,—backward, forward, lateral, or prolapsed, depending on the position.

Causes: A consideration of the factors concerned in maintaining the uterus within the normal limits of position will indicate in a measure the causes of displacements. Several factors usually must be taken into account. Anything that disturbs one or more of the supports will be a causative factor. Injuries and lacerations connected with childbearing play a prominent part; also getting up too soon after childbirth or miscarriage, or retaining one position too long in bed while the uterus is still large and heavy.

Failure of the uterus to return to its normal size after childbirth is another cause, making it impossible for the ligaments and other supports to hold the organ up in position.

Occupations requiring women to stand too much; sitting in a cramped or improper attitude; bicycle riding; sudden falls; faulty clothing, especially restrictions around the waist, such as a tight, ill fitting corset, skirt bands, and heavy skirts supported from the waist; and high heels, which throw the weight of the body out of its right lines, all are important influences in causing displacements.

There are also constitutional causes. Any disease that weakens the entire body will weaken these supports. Anæmia, consumption, kidney or heart disease, constipation, and many

others could be mentioned. Great loss in weight may cause displacement by absorption of the cushions of fat about the pelvic organs.

Tumors of the uterus may drag it into any of the abnormal positions. Tumors in any of the surrounding structures may displace it by pressure. Lastly, imperfect development of the supporting structures may predispose to displacements.

Symptoms: The symptoms arising from the displacements depend upon the position. With the backward position, often the broad ligaments are twisted more or less, causing congestion of the tubes and the ovaries. They are pulled back into the hollow of the sacrum. Adhesions follow the inflammatory exudate; and as a result, the entire pelvic cavity is involved. Increased menstrual flow, with more or less pain at the period, may occur; but there is very seldom any disturbance in the menstrual time. Other troublesome symptoms are backache, generally located low over the sacrum, and headache in the top of the head. Bladder and rectal disturbances are sometimes present, especially when the uterus is large and is making pressure on either structure. Leucorrhœa is present in most uterine troubles, so has no particular meaning.

Prolapse of the uterus—a condition in which the uterus, with more or less of the bladder or the rectum, protrudes through the vagina—is a very common condition after the change of life. Loss of weight, weakening of the ligaments, and unrepaired lacerations are the exciting causes.

A displacement is often responsible for a woman's being unable to become pregnant; and if she does conceive, repeated abortions may take place.

Treatment: If there are no unpleasant symptoms associated with a displacement, the patient need not worry about the condition, but should be kept under observation by a competent physician, so as to forestall any complications that might arise.

Various simple mechanical contrivances may sometimes give temporary relief from the effects of a displacement by holding the uterus somewhat in its normal position. These include tampons,—balls of cotton wool or similar material, usually medicated, and applied by a physician; and pessaries of different types, which also must be inserted by the physician.

Local massage by a physician, and postural treatments, may give some relief.

After all such means have been exhausted, the uterus should be restored to its normal position and held in place by some one of the surgical methods of accomplishing this purpose.

If there have been lacerations during labor, have these repaired at once, not only for present comfort, but to guard against serious complications later in life.

Building up the general health tends to strengthen the ligaments of the uterus. This is accomplished by plenty of rest, regular, well balanced meals, sleep, salt glows, sitz baths, warm douches, and enough moderate exercise to digest the meals. Avoid constipation. Clothing suitable to the climate should be worn, no pressure being brought to bear upon the abdominal



The Knee-Chest Position

organs. Following the douche, if the displacement is backward and the uterus is not grown fast, take the knee-chest position for ten minutes morning and evening.

Often the prolapse of the uterus in elderly women who have borne children can be remarkably relieved by surgical means, including repair of the vaginal outlet. In the writer's experience, there have been a number of women over seventy-five years of age who have experienced wonderful relief in this way. With modern surgical methods, such an operation entails practically no danger. A condition in which the womb actually protrudes from the body is not only most uncomfortable and irritating, but may result in cancer formation on account of the irritation.

TUMORS OF THE UTERUS

For simplicity, these may be divided into *benign*, or harmless, and *malignant*, or dangerous.

The uterus is composed of muscle fibers held together by fibrous tissue. The cavity, or inside, is lined with a very soft mucous membrane containing tube-shaped glands. This mucous membrane is normally about one twelfth of an inch in thickness.

The most frequent tumors of the uterus are the so-called fibroid tumors. They are really composed essentially of muscle tissue growing from and resembling the muscle of the wall of the uterus. With this are intermingled varying amounts of fibrous connective tissue. These tumors, as a rule, are benign; that is, they do not necessarily tend to the death of the patient, except by their mechanical interference with the functions of important organs. When present, they are usually multiple—that is, several occur together in the same uterus—and are of varying size, from that of a pea up to immense masses weighing many pounds. They are round in shape except when influenced by pressure, and are firm and hard in consistency.

The age at which they appear is ordinarily the latter half of the period of sexual activity; that is, from thirty to forty-five or fifty.

The cause of these abnormal growths is yet unknown.

Symptoms: The symptoms depend upon the size of the tumor as well as its position in the uterine wall. When situated in the lower part of the uterus, it is a danger in the childbearing period. If it is still lower, down in the cervix, or neck, of the womb, it presses upon the bladder and the rectum. Other symptoms arising from fibroids of the uterus are disturbance of the menstrual flow, generally profuse and prolonged hemorrhage. There is more or less discomfort, gradually increasing until the patient must remain in bed during the entire period. Leucorrhea, or “whites,” is present between the regular periods. There may be a feeling of weight in the pelvis, with backache; and if the tumor is at all large, definite pressure symptoms may occur, such as irritation of bladder, with absence of a feeling of satisfaction after urination. The symptoms in the rectum are somewhat similar, accompanied with chronic constipation.

Pain does not come on until after the growth has reached considerable size. It then manifests itself more at the time of the menstrual flow, or after prolonged standing or walking. The ovaries or the Fallopian tubes may be so pressed upon or pushed out of their normal relations that they cannot function. Pain may arise from this cause.

Constitutional troubles, such as chronic anæmia, are a result of the loss of much blood every month over a prolonged period, as well as of the drain on the body from so much nourishment going to the tumor. Heart disease may be a complication, as may also kidney disease. Loss in weight is not a marked symptom, by reason of the added weight of the new growth.

Treatment: The treatment of fibroid tumors is an important matter, and much can be done to relieve suffering and to save

life in these cases. There are only two methods of treatment for cure of this condition which should receive any attention in the present state of medical knowledge, and these are most effective. The first to be mentioned is surgical removal of the tumors, and this in most instances means the removal of the body of the uterus with the tumors. The second is the use of X ray or radium to effect a cessation of growth and a shrinkage of the tumors. Many years of experience with surgical treatment for this condition, and a number of years' experience with X rays and radium, have brought us to quite definite conclusions as to the best ways of managing the treatment of these cases.

If the tumor is discovered when small—not larger than a lemon—X ray or radium treatment is indicated, and will generally be effective. Of course, such treatment must be applied by a physician who is an expert in the use of these remedies, as they are very powerful agents, and capable of much harm when improperly used. Also it should be borne in mind that their use may interfere with the function of the ovaries for a number of months or years, or permanently suppress their activity. This form of treatment is only applicable when the tumor is small in size and uncomplicated with other conditions in the pelvis which demand surgical treatment, and the decision to use this method should be made only after advice of trustworthy physicians.

In all other cases, the only treatment is surgical removal of the tumor, usually including the body of the uterus with the tumor. Ordinarily this does not include the removal of the cervix or any part of the vagina, and should not include the removal of the ovaries or the Fallopian tubes, unless these also are seriously diseased.

A certain proportion of fibroid tumors, especially those occurring near the menopause (forty-two to fifty years), are malignant in nature, or may become malignant. Other accidents and grave changes may occur in connection with such tumors, and careful treatment of all fibroid tumors is therefore most essential.

Surgical treatment for these conditions, when undertaken early and done under favorable conditions, by competent surgeons, is comparatively free from danger.

Some of the means that may be employed as temporary palliative measures, or in preparation for surgical treatment, but which have no curative influence, are as follows: nutritious, well balanced diet, with plenty of fluids, to combat the anæmia; rest in bed; tonic hydrotherapeutic measures (see chapter 10); keeping the bowels open; astringent vaginal douches to assist in checking hemorrhage.

UTERINE POLYPI

These are long, soft, fingerlike masses having the structure of the mucous membrane of the uterus, either lying in the uterine cavity or projecting from its mouth. They produce severe bleeding, and should in all cases be removed by a surgeon, to stop the bleeding and to prevent the possible occurrence of cancer in them.

TUMORS OF THE OVARY

The great majority of the enlargements of the ovaries are in the form of cysts, which are saclike structures containing fluid material; but some solid tumors are found in these organs.

The two ovaries are small, flattened, oval structures, about the size of large cherries, attached to the back side of the broad bands, or ligaments, that assist in holding the uterus in its position. Each one is situated near the open end of one of the Fallopian tubes, which open into the cavity of the uterus at their inner ends.

The ovaries serve as the seat of origin of the ova, or eggs, each of which, when fertilized by union with a male germinal cell, develops into an embryo and ultimately into a child. Each of these ova lies in a separate small cavity in the ovary; and at the time of each menstrual period, one of them escapes by the bursting of its cavity, and finds its way into the open end of the Fallopian tube. This it traverses, passing into the uterine cavity, where it is either dissolved or escapes with the menstrual flow, unless it becomes impregnated by union with a spermatozoön, or male germinal cell. In that case, normally it lodges upon the wall of the uterine cavity, and there develops into an embryo.

The little cavities containing the ova in the ovary sometimes become unnaturally distended, and are the source of some of the cysts that cause trouble. Cysts of other origin also occur in the ovary. These may reach an immense size, sometimes weighing one hundred pounds or more. These very large ovarian tumors are rarely seen at the present time, for modern surgery has made it possible to remove them before they reach such large size. Many of these ovarian cysts are capable of becoming cancerous and thus destroying life.

Another type of ovarian cyst is called a dermoid. These are peculiar in that various bodily structures, as bone and teeth, are found in their walls.

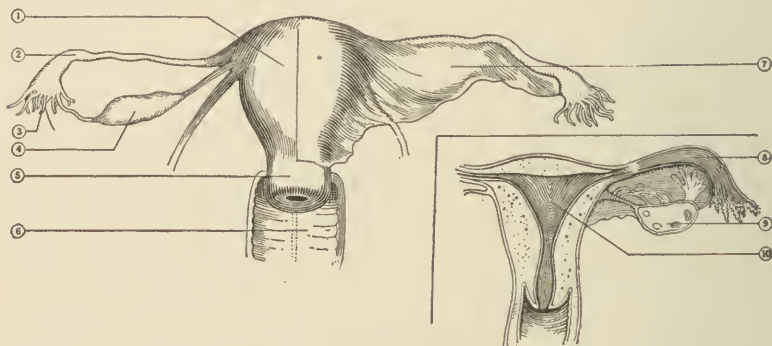
All cystic tumors of the ovary may produce numerous symptoms from pressure, including pain and distention of the abdomen. They must be removed as soon as discovered, to prevent possible dangerous results.

There are two principal types of solid tumors of the ovary: the fibrous tumors, called fibromata; and cancers. These must all be removed by surgical operation as soon as discovered.

INFECTIONS OF UTERUS, TUBES, AND OVARIES

Exclusive of tumors of the uterus and ovaries, the inflammations produced by disease germs are the most important and frequent conditions. These infections are of two principal classes—gonorrheal and puerperal.

Gonorrheal Inflammation. This infection, in most cases, is of venereal origin, but may be contracted in other ways, such as coming in contact with infected articles of clothing or toilet



UTERUS AND FALLOPIAN TUBES

1. Body of uterus, or womb
2. Fallopian tube
3. Fimbriated extremity
4. Ovary
5. Cervix

6. Vagina
7. Broad ligament
8. Cross section of Fallopian tube
9. Cross section of ovary
10. Cavity of uterus

seats. The infection, when present, almost invariably extends from the external genitals to the uterus and the Fallopian tubes. The body of the uterus usually escapes without much inflammation; but the cervix is seriously involved, and the tubes suffer the greatest damage, becoming intensely inflamed, and spreading the infection to the surrounding structures, including the pelvic peritoneum and the ovaries. This type of inflammation rarely extends to the general peritoneal cavity, consequently the disease is only rarely fatal. However, occasionally the infection does travel by the blood stream and produce a fatal disease of the heart. (See chapter 71.)

Symptoms: The symptoms of gonorrheal inflammation of the Fallopian tubes (gonorrheal salpingitis) and the other pelvic structures associated with them, are severe pain in that region,

with fever and prostration. After a few weeks, the symptoms improve; but the injury is permanent, the tubes, in most instances, being completely closed and distended with pus, so that the ova cannot pass through them. Thus future pregnancy is made impossible.

Treatment: This condition leaves the woman a chronic invalid, as a rule, and surgical removal of the diseased tubes is advisable. No such surgical procedure, however, should be undertaken during the early or acute stages of this disease. During the acute stages, much relief may be secured by hot fomentations over the lower abdomen, hot sitz baths, and hot vaginal douches.

Puerperal Infection. This is the name given to the type of infection and consequent disease that frequently occur in connection with the emptying of the uterus at childbirth, or at the time of a miscarriage or an abortion.

Causes: The cause is the entrance of disease germs, especially the streptococcus, into the exposed tissues of the uterine cavity and the cervical canal. It is brought about by failure to secure absolute cleanliness on the part of the physician, the midwife, or the nurse, during delivery, or the introduction of undisinfected instruments or other objects into the birth canal or uterus. In the case of abortions that are intentionally produced by introducing instruments into the uterine cavity, notably in criminal abortions, there is great danger of such infections.

These puerperal infections are most serious, and in a large proportion of cases, even with the best of treatment, are fatal. The inflammation may extend from the uterus to the ovaries, causing abscesses, and to the general peritoneum, resulting in fatal peritonitis. In some cases, the infection involves the large veins in the pelvis and in the thighs, producing the condition called milk leg.

The best of medical attention in this condition is demanded, and abscesses that form must be opened.

The great danger of the occurrence of this disease emphasizes the importance of securing the most expert attention and the best surroundings for the mother during labor.

HEMORRHAGE FROM THE UTERUS

Excessive bleeding may occur in connection with the menstrual periods, or it may continue or come on between the periods.

Causes: The most frequent causes of uterine hemorrhage are:

1. Fibroid tumors of the uterus, particularly those of the inner portion of the uterus next to the cavity.
2. Other tumors, as cancers.

3. Hypertrophic endometritis, a condition in which the mucous membrane lining the uterine cavity is overgrown, very thick and soft, and full of blood vessels.

4. Cases of excessive menstruation in which no recognizable cause can be found. These are most usual in girls or young women.

Treatment: The treatment of fibroid tumors has already been discussed in this chapter.

In case of hypertrophic endometritis, the best treatment is eurette (scraping out) of the uterine cavity by a physician. This is not a very common condition.

In cases for which the cause cannot be found, if general treatment and care do not serve to correct the condition after several months, the most effective treatment is radium used by a physician who is thoroughly trained in this work. The fact should be kept in mind that this treatment is capable of doing great injury, especially to the ovaries, whose function may be permanently destroyed by an excessive amount of exposure to radium.

LEUCORRHEA

This is not a disease, but simply a symptom of some disease of the uterus or other portion of the generative tract. It is a troublesome discharge of pus- or mucus-containing fluid. The treatment should be that for the condition which causes it, and the use of appropriate astringent or cleansing vaginal douches.

CERVICAL LACERATIONS

Childbirth is always attended by more or less injury to the cervix, or neck, of the uterus. The severity of the tear depends upon many conditions not necessary to mention. Small tears will heal without trouble. Large tears, on the other hand, may be causative of conditions quite incompatible with good health, and are oftentimes at the bottom of serious disease. Chronic inflammation of the lining membrane of the uterus, and catarrh of the cervix, with a disagreeable discharge which always accompanies, are not uncommon. Cancer of the cervix is said to have its origin in old scars from cervical tears. Treatment is surgical and is highly satisfactory.

VULVITIS

This is an inflammation, either pus or germ infection, involving the external genitalia, and usually caused by either a lack of cleanliness, or mechanical irritation, or both. Gonorrhea is found to be the cause in some cases. The infection may resemble thrush of the mouth. (See chapter 27.) Again, certain types

of infection may bring about the development of vegetations that may grow to considerable proportions.

Symptoms: The symptoms are the same as those experienced in any inflammation; namely, burning, smarting pain, swelling, and more or less purulent discharge.

Treatment: Stop the cause. Rest in bed, if possible, for a day or so, to prevent further irritation. Cleanse the parts with soap and warm water frequently, and follow with antiseptic washes. If growths have occurred, they should be touched up with ten per cent silver nitrate, or tincture of iodine, followed with boric acid dusting powder. If they are large, it will be necessary to have them excised.

VAGINITIS

Inflammation of the vaginal covering is frequently gonorrheal in origin. It may, however, be set up by irritating injections, and not uncommonly accompanies pregnancy.

Symptoms: The symptoms are those of an inflammation, and the trouble is always accompanied, after an acute onset, by considerable discharge.

Treatment: The patient should be put to bed. If gonorrheal infection is suspected, it should be treated accordingly. Otherwise, hot cleansing douches, 100° F., and hot antiseptic douches—boric acid, one dessert-spoonful to a pint of water, or 1-1,000 bichloride—should be used two or three times a day. Hot sitz baths, fomentations to the lower abdomen, with hot foot baths, and cold mitten frictions, will be in order as remedial measures.

BARTHOLINITIS

This refers to the inflammation of the glands of Bartholin, usually one at a time, situated in the tissues on either side of the vaginal opening. The trouble is invariably of gonorrheal origin, and has every appearance of an ordinary boil. It should be lanced and cared for as a boil. Hot applications to the part will afford considerable relief, and a flaxseed poultice may be indicated to draw the inflammation to a head.

PRURITUS VULVÆ

An itching and stinging of the genitalia. (See chapter 53.)

LACERATIONS OF THE PERINEUM

Some degree of injury to the pelvic outlet is unavoidable in the birth of the child. The tissues are bruised, fearfully stretched, and torn to a varying extent. Usually, under careful management, the amount of laceration is sufficiently limited to

make possible a successful repair by a stitch or two taken after the delivery. In spite of the best of care, however, bad lacerations, involving a large part of the pelvic floor, sometimes occur. A tear is often not apparent at the time of delivery, and unless a thorough examination is made, will only make its presence manifest in the future by unmistakable symptoms.

Symptoms: Heaviness in the pelvis, a sense of loss of support; pain in the ovaries; backache; general lassitude and physical debility; nervousness. Constipation is a common attendant on this disorder, and is due to the mechanics of the disorder. The uterus may be enlarged and heavy, not having returned to its normal size after childbirth. It is invariably in a wrong position, pulling on some organs surrounding it, and resting on others. It may have dropped down to such an extent that the cervix protrudes from the vagina. Straining at stool causes the rectum to pouch into the vagina, producing what is known as a rectocele. Lack of proper support affects the integrity of the bladder, also, and it pouches in on the front of the vagina, causing a cystocele. This interferes with the proper emptying of the bladder, and a mild inflammation of this organ may result.

Treatment: The treatment is surgical. In skilled hands, the results of pelvic repair work are eminently satisfactory. Chronic invalidism is not infrequently cured for all time by it.

CANCER OF THE UTERUS

For a discussion of this topic, see chapter 77.

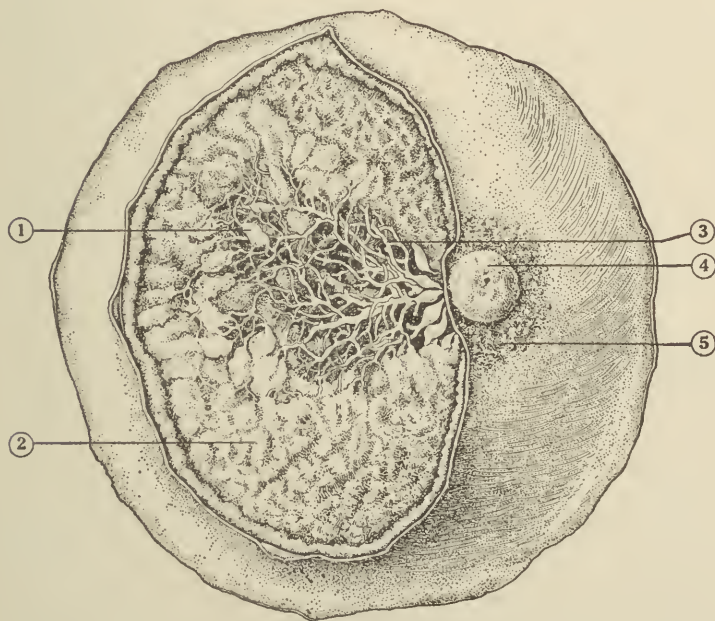
EXTRA-UTERINE PREGNANCY

This is considered in chapter 64.

Diseases of the Breast

As the breasts are the seat of many diseases, it is well to have an understanding of the most common causes, symptoms, and treatments of these disturbances. With knowledge may come the ability to avoid some of the diseases, or to accomplish an early cure. The female breast is part of the sexual apparatus, and most of the troubles arise after sexual life is well developed.

Unusual formations of the breasts and nipples are not uncommon. Cases have been reported of multiple mammæ located in different parts of the body. The most frequent position is below the true mammæ. Overgrowth of one or both of the breasts may occur. This condition comes on in the early teens. Imperfect development of the breasts is very common. Com-



BREAST DISSECTED TO SHOW THE GLANDULAR STRUCTURE

1. Secreting parts of milk glands
2. Fat tissue

3. Ducts of milk glands
4. Nipple
5. Areola

plete absence is a very rare condition, and is usually associated with deformities of the pelvic organs. The nipples are sometimes defective in development, giving rise to difficulty in nursing the children. Corrective measures for these defects should be used during the period of pregnancy, and not be neglected until after the birth of the child.

The breasts are regarded as specially developed sebaceous glands, composed of from fifteen to twenty tubules. These divide and subdivide, finally ending in small sacs, each of which is lined with small cells that secrete the milk. The nipple is the clustering together of these fifteen to twenty tubes. Immediately around the nipple is a very smooth, slightly pigmented area of skin, studded with small sebaceous follicles. These become much larger, and very marked pigmentation takes place, during pregnancy.

Abnormalities in Function. Complete absence of milk secretion after the birth of the child is rare, but deficient milk secretion is very common. The size of the breasts is no indication of their ability to furnish milk. Their activity depends upon the amount of glandular tissue. Small breasts may be composed of secreting tissue with little or no fat. At times, we find the unpleasant condition of excessive secretion, which persists after weaning, seriously impairing the general health.

INFLAMMATION OF THE BREAST (ACUTE MASTITIS)

The commonest acute disorder of the breast is acute mastitis, or inflammation of the breast. This is seldom seen except during the nursing period, and especially during its early stages. Cracks or small injuries of the nipples usually precede the inflammation, and give opportunity for the entrance of the disease germs that are the cause of the trouble.

Symptoms: The inflammation occasionally is superficial, affecting only the nipple or the surrounding skin. In this case, careful cleansing of the nipple, with frequent applications of some mild antiseptic solution, such as saturated solution of boric acid, is all that is necessary. Oftener the inflammation is in the deeper structures; and in this case, there will first be noticed tenderness, pain, and swelling, especially in the affected portion of the breast. There may be a chill, and the fever will be moderate or very high (100° to 105°), depending on the severity of the infection. The pulse will be rapid, with headache and other manifestations of fever.

Treatment: The treatment should consist in keeping the patient in bed, supporting the breast by a suitable bandage, the

administration of a cathartic (see chapter 12), and copious water-drinking. As far as possible without too much pain, the milk should be removed from the breast at intervals by a breast pump, or by manipulation with the hands, coconut oil or other lubricant being used. One of the principal features of the treatment at first should be the application of cold to the breast in the form of an ice bag. This should be applied over a thin towel, and left on almost continuously for about two days, being removed every two hours for twenty or thirty minutes, during which time hot applications

(fomentations) should be applied. If, after two days, the fever still continues and the breast does not improve, then it is probable that an abscess is forming. This must be treated by a physician, and free incision must be made to give the promptest relief. Otherwise the condition will last for a long time, usually will finally burst and the pus be discharged, and often will spread to other parts of the breast, and result in permanent crippling, leaving scars which in later years may be the starting point of breast cancers.



Breast Binder

Unnatural enlargement (hypertrophy) of one or both breasts sometimes occurs. This is most usual in girls or young women. The cause is not known, and there is no treatment that can be recommended.

TUMORS OF THE BREAST

These appear as lumps or firm masses that can be felt within the breast tissues. There are a number of different varieties, which can be divided into two general classes, the *benign* and the *malignant*.

The benign are those which in themselves are not dangerous to life. The malignant are the cancers, which are always sooner or later fatal unless removed. The great majority of lumps in the breast which last for any length of time are cancerous, or will become cancerous unless removed. In the earlier stages of these growths, when they are still fairly small, it is not possible

by ordinary examination to tell which ones are cancerous and which are not. Therefore the only reasonable way to regard any lump in the breast is to look upon it as cancerous until it is proved not to be; and the only way to prove that it is not cancerous is to remove such a mass, that it may be adequately examined.

Among the recognized types of benign tumors may be mentioned the adenomas, and the fibro-adenomas, which are composed essentially of an overgrowth of the glandular tissue (the secreting part of the organ), and varying amounts of fibrous connective tissue. It is thought that these forms of tumors do not so often become cancerous as do some of the others to be mentioned.

Another common form of benign growth is known by various names, but is frequently called chronic cystic mastitis. It usually appears in women from thirty-five to fifty years of age, and may be in one or both breasts. The tumor mass is not so easy to outline by examination as other forms, because the entire breast tissue has a tendency to be harder than normal. So it is often necessary to remove a large portion or all of the involved breast, in order to be sure of completely removing all the diseased portion. In this form of growth, there is an increase of the cells composing the gland tissue proper, as well as of the fibrous supporting tissue, and a definite tendency to the formation of smaller and larger cavities filled with fluid, caused by the distention of the small glandular spaces with an abnormal secretion. These little cavities are called cysts; hence the name of the condition.

Another less common type of tumor growth is the papillary or wartlike growth in the milk ducts. These are often accompanied by the discharge of a small amount of bloody fluid from the nipple. This form of disorder is important from the fact that it frequently becomes malignant, or cancerous.

The physician speaks of those disease conditions in the breast which, while in themselves not cancerous, show a tendency to become cancerous, as precancerous conditions. Of the conditions already enumerated in this chapter which are recognized as having this tendency, we should name:

1. Chronic cystic mastitis.
2. Papillary growths of the milk ducts.
3. The scars that result from abscesses in the breast.

Cancer of the breast is discussed in chapter 77.

Menstrual Disorders

In considering the disturbances of menstruation, it will not be amiss to say a few words about the girl before she reaches the age of puberty, or the time when she becomes a woman.

From birth until this period, the reproductive organs remain in a partially undeveloped state. The boy and the girl are much alike in their growth and habits if permitted to grow naturally. Unfortunately, the girl is handicapped in her development, by the pernicious customs and lack of education of our mothers. While her brothers are allowed to romp and play and grow in a natural way, she is trained to act and dress like a young lady. Too often the mother represses the little one's desire to play and be free by telling her that these things are unladylike and that she must be a little lady. She is encouraged to study the fashion plates, and with this comes the desire to dress like grown-up women and to do the things she sees her older sisters do. Many mothers make the sad mistake of dressing their little girls in such a manner—without proper protection of the limbs and other parts of the body—that they are exposed to cold and disease at a most critical period of life; and many girls, as a result of these indiscretions, become lifelong invalids or fill untimely graves.

PUBERTY

Many of the disturbances that will be considered in the following pages are caused by exposure and indiscretions at a period when the girl should have the tenderest care and the most careful guidance. The age of puberty, or the time when a girl passes from girlhood to womanhood and becomes capable of bearing children, is usually between the ages of eleven and sixteen, although cases are on record in which the child has matured at an earlier age than eleven. There are also cases in which puberty, or the first appearance of the menses, has occurred later than sixteen.

In tropical climates, this period comes earlier; while in cold climates, it is retarded. Excitement of any kind, such as parties, dancing, theaters, and novel-reading, exhausting school studies, long hours of piano practice, and indolent habits tend to hasten the period of puberty.

As this time approaches, the mother should see that her daughter has opportunity for exercise and freedom in the open air. She should have an abundant supply of nourishing food,

avoiding the use of stimulants, condiments, and all irritating substances, such as pepper, mustard, vinegar, pickles, spices, tea, coffee, and rich or highly seasoned food. The child should observe regular habits in sleeping, eating, and exercise. She should have a reasonable amount of work to do, but should also have time for out-of-door play and exercise. Wholesome exercise often delays the menstrual function by giving healthy tone to the muscles and improving the general circulation.

The period of puberty is marked by the rapid development of the breasts and the sexual organs. A growth of hair appears in the axillæ and in the pubic region. The outlines of the body become more rounded, and the girl assumes a more graceful, womanly appearance. When the organs have reached this stage of development, there appears a bloody discharge from the uterus, that is known as the menstrual flow, menstruation, the menses, the periods, the monthly flow, and being "unwell."

Menstruation is a discharge of blood and mucus from the uterus, or womb, recurring every four weeks, from puberty to the menopause, except during pregnancy and the flow of milk (lactation). As the time for the period approaches, the girl often has a feeling of heaviness and discomfort, sometimes backache, although there should be no pain, as this is a normal physiological function. The discharge at the beginning is of a yellowish brown color from the mixture of mucus and blood. During the second and the third day, the discharge has the appearance of pure blood. On the fourth day, it becomes scantier and of a brownish color; and it continues thus until it finally disappears.

Need of Instruction. Every mother should see to it that her daughters are properly instructed before the menses appear, that they may know how to care for themselves. How often we meet women who came to this period without instruction and altogether ignorant of the condition! Not knowing the meaning of the discharge, they have bathed in cold water or have washed and replaced the damp clothing, and have thus produced congestion or inflammation that has caused suffering perhaps for life.

NORMAL MENSTRUATION

The menstrual periods occur every four weeks, although there is variation in different individuals. In some cases, the periods have occurred regularly every three weeks; while in others, they have been delayed, occurring only once in five or six weeks. There is often a variation of two or three days, yet the woman may seem perfectly well.

The Flow. It was formerly believed that the menstrual blood was in some manner different from normal blood, as it did not

clot during regular menstruation. But this theory was disproved by the fact that in cases of hemorrhage or profuse flow, the blood does clot. It is now believed that the admixture of the blood with the vaginal secretions prevents clotting, unless the blood is in such large quantity that the acid secretion is not relatively sufficient.

The length of time of the flow also varies in different individuals. It is usually stated that the normal period is three or four days; but in many cases, the flow continues from six to eight days, and the woman seems in every way normal. Again there are cases in which the period continues but one or two days.

It is rather difficult to estimate the amount of blood that passes at the regular period, as there is such a variation in amount in different individuals, and also because of the difficulty in measuring the quantity. Probably the average amount is about four to eight ounces. The amount of flow is influenced to a considerable extent by conditions and environment. Women of indolent habits usually flow more freely than those who are active. Frail, feeble women are likely to flow more freely than those who are fleshy and robust.

Most women have a wrong opinion with reference to the menstrual blood, believing that during the time intervening between the periods, the blood accumulates in the uterus, or womb, and at the time of menstrual period, that organ simply empties itself. The womb is a small organ, about the size and shape of a small pear. A few days preceding the period, the membrane lining of the cavity becomes congested and filled with blood, which, during the menstrual flow, oozes from the membrane and passes off.

In some cases, there is a very scanty flow, which seems perfectly normal. If there is no pain or other symptoms than the slight discharge of blood, no significance should be attached to it, and no treatment is indicated. Scanty menstruation may result from some wasting disease, as consumption, or from some disease of the ovaries, or to ante flexion of the uterus. In such cases, the general health should be built up—by means of wholesome food, by living out of doors, and by the use of tonic hydropathic treatments—fomentations to the spine, followed by a cold friction or a salt glow, with neutral spray, and massage to spine and limbs. A few days before the time for the period, the patient should take a daily warm sitz bath for fifteen minutes. It is often more convenient and probably more effective to take the sitz bath just before retiring. (See chapter 10 for treatments.)

During pregnancy and lactation, the menstrual flow ceases. There are, however, exceptions to this, and a few women men-

struate for one or two periods after they become pregnant, and occasionally a woman has her periods regularly throughout pregnancy. There are also cases in which the periods appear during lactation, or the time in which the mother is nursing her child.

Precautions. While menstruation is a normal physiological function, and not a diseased condition, many women would save themselves an endless amount of inconvenience and suffering by taking proper precautions at this time. A very good rule to follow is to rest, preferably in bed, the first and second days of the menstrual period, from puberty until the age of twenty at least, when the young woman becomes well matured and her functions fully established. Many women, especially those who flow very freely, would do well to make this a rule throughout the menstrual life. It is indeed sad to see so many promising young women disregarding their health, and at this important stage, attending dancing parties, theaters, and other exciting amusements, which often call for late and irregular hours, thus putting an extra strain upon the delicate organs when they are already extremely congested and need rest. During the period of the flow, the bowels should be kept in good condition, by enemas or simple laxatives if necessary. A simple diet is far better than rich, stimulating food, at all times, but particularly during the menses.

Careful attention to these simple suggestions would better fit young women for the responsibilities of motherhood, and would also add to the strength and vigor of the coming generation.

ABSENCE OF MENSTRUATION (AMENORRHEA)

Amenorrhea is a condition in which there is absence of menstruation for one or more periods between puberty and the menopause. That which occurs during pregnancy and lactation is known as physiological amenorrhea, and should give no concern.

Amenorrhea is not a disease, but merely a symptom. When it occurs in girls after the age of sixteen or seventeen, it may be attributable to poor general health—some constitutional disease, as anæmia, chlorosis, or tuberculosis; to any acute disease, as typhoid fever, scarlet fever, or diphtheria, or to heart disease. In some cases of obesity, there is a diminished flow, and it may cease altogether. In any case of amenorrhea, great care should be taken to find the cause of the trouble; and when this is found, every effort should be made to remove it and build up the general health. Often this will relieve the patient, and no local treatment will be necessary. Amenorrhea may be due to obstruction of the canal, a malformation of some kind, or an imperforate hymen.

It sometimes occurs that the uterus, or womb, is in an undeveloped condition, and no treatment is indicated. When the general health is poor, the patient should have tonic treatment. Cold mitten friction improves the circulation and also acts as a tonic. Olive oil or coconut oil rubs given daily are often beneficial; also salt rubs, given with coarse salt or with a Turkish towel that has been dipped in a strong salt solution and allowed to dry, the body being rubbed vigorously, beginning with the arms, then proceeding with the legs, next the chest and the abdomen, and lastly the back. (See chapter 10 for description of treatments of various kinds.) Swedish massage, if given by a person skilled in its use, is also helpful in run-down conditions. A daily dip in the surf when practicable is of much value. Regular but not too vigorous exercise should be taken. Walking and rowing, and, in some cases, golf and tennis, may not be found too vigorous. Attention should be given to the diet, the most nourishing foods being used. In any case, a trustworthy physician should be consulted.

EXCESSIVE MENSTRUATION (MENORRHAGIA)

The menstrual flow may be too profuse, or it may last too long. This condition is known as menorrhagia, or excessive menstruation. While the amount of blood thrown off at the monthly period varies in different persons, it is fairly constant in each individual case; that is, a woman usually flows about the same amount each month. An amount noticeably in excess of this is known as menorrhagia. This condition may result from general debility, in which the patient may flow almost continuously from one period until the next. The patient becomes thin, pale, and weak from the loss of blood. It may be due to an inflamed condition of the lining membrane of the uterus. This is probably the most common cause.

Causes: In some cases, the uterus has never returned to its normal size after childbirth. It remains large, heavy, and congested; and in this state, the blood oozes freely and thus there is an excessive flow. Tumors and cancers also may cause a profuse flow.

In some instances, the flow is excessive during the first few months of married life. This usually subsides after a few months, without treatment.

There may also be a profuse discharge of blood from the uterus as a result of interference with the general circulation in some diseases of the heart, liver, or lungs, when the pelvic organs are in a healthy condition. In the treatment of this, as in other

forms of disease, we must first find, if possible, the cause, and set about to remove it.

Treatment: In all cases of menorrhagia, it is best to put the patient to bed. Give a light diet; and while the patient is confined to the bed, see that the bowels are kept regular by means of laxative fruits or by cool enemas. In case of profuse flow, elevate the foot of the bed about ten or twelve inches by placing blocks or boxes under the legs of the bed, remove the pillow from under the head, and instruct the patient to keep quiet.

Apply cold compresses to the lower part of the abdomen for an hour at a time, then remove for twenty minutes, and repeat the treatment. At the same time, a hot bag may be applied to the lower part of the spine.

For feeble patients the food should be of the most wholesome, nourishing character, without overtaxing the digestion, stimulating foods being avoided. When the flow is checked, the patient's general health should be built up by means of thorough treatment in the interim between the periods.

If the excessive flow is caused by circulatory disturbances arising from disease of some other organ, no local pelvic treatment will be of any permanent value, but the patient should consult a competent physician, who will give such treatment as indicated to relieve the cause of the difficulty.

In many cases of debility in which there is a general lack of muscular and nerve tone, a cold sitz bath given from five to seven minutes, at a temperature of seventy degrees, will be of great benefit. Cold mitten friction given daily, following a short hot fomentation to the spine, acts as a good tonic. (See chapter 10.)

PAINFUL MENSTRUATION (DYSMENORRHEA)

Another condition frequently met, especially in young women, is painful menstruation, known as dysmenorrhea. This is perhaps the most distressing of the menstrual disturbances, and it is sometimes so severe that the patient dreads the approach of the period. There are a number of varieties of dysmenorrhea, the difference being due to the different causes of the condition. The commonest classification of these is: neuralgic or ovarian, congestive or inflammatory, obstructive and membranous.

The neuralgic form is most frequent in women of neurotic temperament; or those in whom, for some reason, the nervous system is below par. The pain is sharp, and radiates to different parts of the pelvis. The patients often complain of pain in the lower parts of the abdomen and back; and at times, it extends down the thighs. At some time during the period, there may be a violent headache. The pain is often worst at the beginning

of the period, but is somewhat erratic, and may occur at any time during the menstrual flow.

The congestive form of dysmenorrhea may be caused by getting the feet wet just before the period, by running a sewing machine, by lifting, or standing for hours, or by exhaustive work. The pain is greatest the first day or two, and subsides as the flow becomes established. If it begins a day or two before the flow appears, it indicates ovarian disturbance. The pain is of a throbbing, inflammatory character, and the soreness is increased by walking or standing.

Obstructive dysmenorrhea results from some interference with the outward flow of blood. It may be due to lack of development, which results in a very small canal. Sometimes there is a stricture or tightening from the scar tissue following an operation. It may be caused by a sharp ante flexion or retro flexion of the uterus, the canal being practically closed by a bend. Occasionally small tumors, as polypi, may so fill the canal as to obstruct the flow. The pain in this form of the ailment differs from the neuralgic or congestive in that it is paroxysmal in character, probably because of contraction of the uterus in an attempt to expel the blood. While this form is known as obstructive, there are cases in which the pain persists after the obstruction has been removed. This has led to the belief that in many cases, it is largely occasioned by some nutritive disturbance, especially at the time of puberty.

The membranous form of dysmenorrhea is that in which, at certain menstrual periods, the lining membrane of the uterus is thrown off. There is severe bearing down pain until the membrane is expelled, when the pain ceases. In these cases, often the membrane is expelled in shreds, and not the entire membrane at one contraction. This form also is probably caused by some nutritive disturbance or by a diseased condition of the uterus or of the lining membrane.

Treatment: In the treatment of all forms of dysmenorrhea, special attention should be given to the building up of the general health. Regularity in the habits of eating, dressing, sleeping, and exercise should be most carefully observed, and the food should be the most wholesome and nourishing, greasy and fried foods being avoided, also spices, vinegar, pepper, mustard, tea, and coffee. There is no doubt that many of these cases, especially of young and growing girls, would be much improved by a vegetarian diet. (See chapter 25.) There is no subject of greater importance in relation to pelvic disorders, than that of dress. The tight corset, which was once such a factor in the cause of

diseases of women, has, we are happy to say, been relegated to the past; but the styles that permit exposure of the limbs, the neck, and the chest, often chilling these parts, and causing internal congestion, are very harmful, and in many instances, lay the foundation for permanent disease. The bowels should be kept regular.

It is advisable, in cases of dysmenorrhea, for the patient to be quiet for a day or two preceding the period. On the two evenings before the beginning of the menstrual flow, a warm sitz bath at a temperature of one hundred degrees is often of value. A hot sitz bath or a hot full bath should be given on the day when the period is expected. The feet should be kept warm by means of a hot water bottle. Fomentations over the lower abdomen and back frequently give great relief, and a prolonged hot enema or hot vaginal irrigation is sometimes beneficial. The hot hip and leg pack is helpful in allaying the pain.

In all cases of dysmenorrhea, a careful examination should be made by a capable physician, in order that the exact cause may be learned if possible, and the proper treatment administered or advised. Some variations in the treatment may be necessary in the different forms of dysmenorrhea, but this should be decided by the physician. It sometimes happens that at the time when the period should appear, there is a bloody discharge from some other part of the body, as the stomach, the lungs, the nose, the eyes, the ears, the rectum, the bladder, or any mucous surface; or it may even ooze from the skin. This condition is known as vicarious menstruation. There may at the same time be a slight flow from the uterus. This is a rare malady, and is usually found in women of a nervous temperament in whom there is some lack of development of the uterus. The pelvic disorder should be treated and the patient's general health built up.

PRECOCIOUS MENSTRUATION

Precocious menstruation is that which occurs in the child before the age of puberty. At times, there is a slight bloody discharge from the vagina even in infancy. This is a rare condition, and requires no treatment, as it seldom continues long.

THE MENOPAUSE

The menstrual periods occur from puberty till the menopause, or for about thirty or thirty-five years. As the menopause, or change of life, approaches, there is often an irregularity of the flow—a missing of a period, or too frequent or profuse flow. The menopause takes place between the ages of forty-five and fifty, although in some cases it has occurred earlier than forty-

five, and in others, later than fifty. At this time, the pelvic organs begin gradually to decrease in size; and as a rule, the organs lose their power to reproduce, when menstruation ceases. In many cases, there are nervous symptoms, hot flashes being followed by cold sensations. The patient may fail in health generally, lose in flesh, and have poor appetite. There are sometimes reflex symptoms of various kinds—nausea, vomiting, disturbance of the heart or other organs. There may be extreme weakness, depression, and in some cases, forms of mental disturbance, as melancholia or mania. This is a critical time in the life of a woman; and before she reaches it, the greatest care should be taken that all disturbing influences are suppressed, and that the body is put in the best condition possible. Much of the suffering that accompanies the change of life might be avoided by careful treatment of all menstrual disorders before this time, and by attention to the general health.

Symptoms: Almost every symptom known to womankind may occur during the menopause—headaches, backaches, digestive disturbances, fainting, constipation, diarrhea, soreness of the breasts, hysteria, and all forms of nervous symptoms. As a woman approaches this period, she should be relieved of all taxing cares, and should live a free, happy life, with as little excitement as possible. She should attend to all the laws of health in her eating, dressing, and exercising. In the home, she should be shielded from whatever would perplex or annoy her, and should have the pleasantest surroundings. A happy home adds much to the comfort and health of a woman at this time of life.

As to the duration of the menopause, there is little to be said, as it varies greatly in different individuals. Some cease menstruating abruptly, with no disturbing symptoms; others pass through the nervous and menstrual symptoms in a few months or a year or two; while with others, the nervous symptoms may continue for nine or ten years.

Treatment: It is difficult to outline in detail the treatment for this condition, as there is such a variety of symptoms. Freedom from care, outdoor life, regular habits, wholesome diet, with tonic treatment, such as salt rubs, cold frictions, oil rubs, and massage, add much to the comfort of the patient and often lessen the severity of the symptoms.

CHAPTER 64

Pregnancy and Childbirth

The development of a new life in the uterus, the performance of the function of reproduction, is always attended with marked changes in the entire being of the mother. These changes are divided into two classes, local and general. The former pertain to developments in the uterus, or womb, and the breasts; the latter, to those involving the rest of the body.

LOCAL CHANGES

The uterus in its virgin state is small, measuring only two and a half to three inches in length, one and three fourths inches in width, and three fourths of an inch in thickness. In the normal condition, it is a firm organ; but during pregnancy, it becomes very soft, and increases greatly in size and capacity, weighing about two pounds when empty, instead of two ounces, as in the virgin state. The muscle fibers become larger, and increase in number, developing its power of contractility and retractility very decidedly. The uterus grows much faster than the growing ovum distends it; and when the child is ready for delivery, the uterus is a powerful hollow muscle. It expels the child and the afterbirth with great force, and gentleness withal. The blood vessels increase in size and number. Some of the veins become as large as a finger, specially where the afterbirth attaches. The vagina and the vulva become softer and more distensible. All these changes are effected by nature, preparing for the delivery of the child.

The breasts begin to enlarge early in pregnancy. There is a tingling sensation, also a feeling of fullness and tenderness. With some women, the breasts are sore to touch as early as the fifth week. The nipple enlarges and becomes more prominent. Around the nipple, the areola darkens and becomes puffy. In the areola, there are small red eminences, glands of Montgomery, that become prominent during the early weeks of pregnancy. A substance known as colostrum forms in the breasts. In brunettes, the areola around the nipples darkens to a dusty brown color, specked with pigment; in blondes, the areola is

pink in color. Blue veins often show through the skin, and light purple radiating lines appear on the surface—usually more noticeable in blondes.

GENERAL CHANGES

Every tissue and fiber in the woman's body feels the impetus of pregnancy. Some writers say, "Pregnancy is a disease of nine months' duration." Many women suffer during the entire nine months, while others feel best when pregnant. This condition certainly tests the integrity of every organ in the body; and if any one of them is diseased, that fact surely will be brought out.

The blood is increased in amount in the last months of pregnancy, and its clotting properties are increased. In this way, nature prepares for the loss of blood during labor. The heart enlarges slightly. The veins of the legs are more or less varicose, forming reservoirs for blood. The thyroid gland in the neck, the spleen, and all blood-producing organs increase in size and activity.

The lungs are pushed upward by the uterus as it expands. The chest broadens, but the capacity is not increased. Breathing is thoracic in type; and if the uterus is overdistended, it pushes the abdominal organs against the diaphragm, causing difficulty in breathing.

The urine is increased in quantity. Sugar may be present in traces at times, also albumin; but these are significant only as they continue to be present. The kidneys and the liver are weak spots during pregnancy, and need to be carefully watched.

The patient puts on fat. Part of this may disappear afterwards, especially if she nurses her infant. Nature seems to lay up a stock of nourishment in the form of fat, for the labor and the lactation.

The skin turns darker, particularly in brunettes; and in all women, some pigmentation of the navel and nipples is noticed. Usually this pigmentation is absorbed after delivery. Sometimes the face is covered with brownish pigmentation resembling freckles. This is often called "the mask of pregnancy." The sweat glands and the sebaceous glands are more active, causing free perspiration on the least exertion. Purplish lines like those on the breasts appear on the abdomen in much larger numbers, extending to the thighs and the groins. They are caused by the stretching of the skin, and are much more common in some women than in others. A woman who has had several children may have none of these striae on the abdomen. The mouth often fills with saliva, because of an increase in the secretion, so that there is

a constant dribbling of saliva, which is most annoying to the patient. This condition, known as ptyalism, is similar to the vomiting of pregnancy, and is often associated with it.

The teeth decay easily. "Every child a tooth," is an old saying, but true. The decay of the teeth is due to changes in the saliva and to the use of the lime salts for the growing child.

The taste is perverted, the patient often craving unusual things to eat, some of which are indigestible. It is not unwise to satisfy these cravings if the article desired is not harmful. Chalk, clay, sand, slate pencils, paper wads, are craved by some.

Constipation is a common symptom, because the bowels are cramped during pregnancy, as the uterus enlarges.

Stomach. The patient is often sick at the stomach, notably in the early morning hours; hence the name "morning sickness." This is a diagnostic sign of pregnancy. When vomiting continues over a period of more than three months, it becomes a serious symptom, often producing a miscarriage, or hemorrhage from the stomach.

The Nervous System. Women are more sensitive and irritable during pregnancy than at other times. Their characters are changed. For example, they may develop a morbid desire to steal (kleptomania), or an insane desire to set fire to buildings and articles of furniture (pyromania). Sweet-tempered women may become soured, and *vice versa*. Often they are morally uncertain.

DIAGNOSIS OF PREGNANCY

This is not always easy, even in late months; and in the early months, it may not be made with certainty by an expert. Below are a few points on which to base the diagnosis of pregnancy:

1. *Cessation of the menses in a normal, healthy woman.* If a woman in the period of reproductive life ceases to menstruate, the probability is very strong that she is pregnant.

2. *The morning sickness.* If a woman in healthy condition is affected with morning nausea and vomiting, there is a presumption of pregnancy, but no more than a presumption. Together with the absence of menses, the symptom has some value.

3. *Enlargement of the breasts and the areolar signs.* These evidences are strong, but not certain, because nervous women show them at their menstrual periods. Shooting pains in the breasts, prominence of the nipples, puffiness of the areola, pigmentation, and the colostrum may be noticed.

4. *Quickening, or "feeling life."* This is a subjective sign that is observed by the woman, and has no positive value; for

January OCTOBER	1 8	2 9	3 10	4 11	5 12	6 13	7 14	8 15	9 16	10 17	11 18	12 19	13 20	14 21	15 22	16 23	17 24	18 25	19 26	20 27	21 28	22 29	23 30	24 31	25 1	26 2	27 3	28 4	29 5	30 6	31 7	NOVEMBER
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March DECEMBER	1 6	2 7	3 8	4 9	5 10	6 11	7 12	8 13	9 14	10 15	11 16	12 17	13 18	14 19	15 20	16 21	17 22	18 23	19 24	20 25	21 26	22 27	23 28	24 29	25 30	26 31	27 1	28 2	29 3	30 4	31 5	JANUARY
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September JUNE	1 8	2 9	3 10	4 11	5 12	6 13	7 14	8 15	9 16	10 17	11 18	12 19	13 20	14 21	15 22	16 23	17 24	18 25	19 26	20 27	21 28	22 29	23 30	24 1	25 2	26 3	27 4	28 5	29 6	30 7		JULY
October JULY	1 8	2 9	3 10	4 11	5 12	6 13	7 14	8 15	9 16	10 17	11 18	12 19	13 20	14 21	15 22	16 23	17 24	18 25	19 26	20 27	21 28	22 29	23 30	24 31	25 1	26 2	27 3	28 4	29 5	30 6	31 7	AUGUST
November AUGUST	1 8	2 9	3 10	4 11	5 12	6 13	7 14	8 15	9 16	10 17	11 18	12 19	13 20	14 21	15 22	16 23	17 24	18 25	19 26	20 27	21 28	22 29	23 30	24 31	25 1	26 2	27 3	28 4	29 5	30 6		SEPTEMBER
December SEPTEMBER	1 7	2 8	3 9	4 10	5 11	6 12	7 13	8 14	9 15	10 16	11 17	12 18	13 19	14 20	15 21	16 22	17 23	18 24	19 25	20 26	21 27	22 28	23 29	24 30	25 1	26 2	27 3	28 4	29 5	30 6	31 7	OCTOBER

TABLE FOR CALCULATING THE DURATION OF PREGNANCY

In the top line, find the date of menstruation; the date below will indicate the time when confinement may be expected. For example, if time of menstruation is March 1, confinement may be expected on December 6.

even a woman who has previously borne children may be positive she feels a child moving in the abdomen, when she is not even pregnant.

5. *Palpation, or feeling with the examining hand, of the fetus and of fetal movements, and hearing the fetal heart tones.* These are the only certain signs of pregnancy, but they can seldom be elicited before the fourth month. A physician has a few means of making diagnosis more certain.

TIME OF CONFINEMENT

This cannot be definitely determined. An error of two weeks or more either way is possible. The time of conception is not known, and the time of labor is more or less influenced by accident, sometimes by external violence. The duration of pregnancy varies in different women, and in the same woman at different times. Experience shows that we can arrive at the time approximately by the following means:

1. Count back three months from the first day of the last normal period, and add seven days. Labor occurs one year from this date.

2. Count twenty-two weeks from the day of quickening for the young mother with her first pregnancy, and twenty-four weeks for the woman who has had one or more children.

3. Count two hundred and eighty days from the supposed impregnation.

4. Count two weeks from the time of lightening—which is usually just before labor, when the fetus settles down farther in the pelvis.

HYGIENE OF THE PREGNANT WOMAN

Dress. The dress should be simple and warm, with no heavy skirts, and no tight bands binding the body anywhere. This will include skirt bands, garters, and corsets. Closed drawers are preferable. All skirts should be hung from the shoulders by means of a waist or suspenders. The secret of dress for the pregnant woman is that there should be no pressure on the womb from above downward. Any downward pressure by corsets or skirt bands displaces the abdominal organs, the intestines are pushed upward against the stomach and the diaphragm, and the uterus is forced down against the pubis and into the pelvis, pressing on the bladder. All organs in the pelvis are crowded down, and congestion results, with a train of other dangers immediate and future. It may cause prolapse of the abdominal viscera and displacement of the uterus, and may interfere with the growth of the child, causing deformities, as clubfoot, *et*

cetera. There are maternity corsets especially prepared for pregnant women, which are so constructed that they support from below, preventing the dragging of the abdomen.

During the later months of pregnancy, most women, particularly those who have borne other children, enjoy much comfort from a support. This helps the abdominal wall to carry the weight of the child.

If the breasts grow large and give distress by their weight, care should be taken that sufficient support is given. Low-heeled

shoes with broad toes are very necessary, for high-heeled shoes are distinctly injurious, causing pain in the back and bearing down sensations in the abdomen. A glance at the figure of a pregnant woman will show how this comes about. Owing to the development of the child in the abdomen, which tends to pull the trunk forward, she throws her shoulders back and straightens her neck. This balances the figure. It gives the pregnant woman a peculiar pose and gait called "the pride of pregnancy." If she wears high heels, the trunk is pushed still farther forward; and to save herself from falling, she throws her head and shoulders very far back, making a sharper bend in the lumbar region. This causes pain here and over the abdomen in front.

Preservation of the Figure. Naturally women are desirous that the function of childbearing should not leave them in an ungainly shape with a protuberant abdomen. The commonest complaint is that it develops a "high stomach" after labor. Certain changes in the body are the necessary results of childbirth, and beautify the figure, although some women do not regard them in this light. The hips are usually larger, with a rounding out of the figure, the busts are broader, and there is



An abdominal binder, showing the mechanics of the support afforded

a more matronly appearance. Some put on fat after delivery, and nothing will prevent it. Antifat medicines should not be taken during pregnancy nor afterwards.

To prevent the "high stomach," or prominent abdomen, much may be done. The condition is due to weakened abdominal muscles, or separation of the recti (straight muscles) in the front of the abdomen, which latter condition is called a "rupture." Either condition will cause the intestines to fill with gas and fall forward. The stomach, the kidneys, and the liver may prolapse. An exceptionally large child, twins, or weak abdominal muscles may produce this condition. Corsets worn during pregnancy add to the strain in the lower abdomen, and favor muscular weakness. High-heeled shoes are another factor. Overstraining during labor, and inattention to the bowels after labor, are other causes. To prevent muscular insufficiency, one must begin in girlhood to develop the muscles by active sports, as rowing, swimming, climbing, and gymnastics.

Through the entire nine months, exercise for the whole body should form part of the daily program. During the last three months, some kind of support is recommended, such as a special abdominal binder or maternity corset that is not boned, but corded.

After the birth of the child, the bowels must be regularly emptied, so that gas shall not accumulate and distend the intestines. The binder after labor does not prevent "high stomach," but it is a comfort to the patient when she first leaves the bed. Massage to the abdominal muscles aids in bringing back the original tone to them.

When the legs have become greatly swollen with varicose veins, the patient should wear rubber stockings.

Diet. The diet of the pregnant woman should be simple. Rich foods and fried foods should be avoided. Albuminous foods (see chapter 20) should be used sparingly, as their use increases the tendency to albumin in the urine. Cereals, fruits, and vegetables should be eaten freely, especially fruit and green vegetables, as they loosen the bowels. Plenty of milk and milk products should accompany the meal. If the mother is well nourished, the meals can be reduced during the last two months of pregnancy, to lessen the growth of the child.

No wine nor alcoholics should be taken: first, because of the danger of contracting the alcoholic habit; and second, because of the bad effect on the child. The evil effects of alcoholics on infants were recognized in Biblical times. Manoah's wife, Samson's mother, was instructed to take neither "wine nor strong

drink." A child conceived when the father is intoxicated may be stupid or diseased.

Exercise. A moderate amount of exercise must be taken each day, but the patient should always stop short of fatigue. A woman cannot during pregnancy develop muscles to make labor easy. All this should have been done before. If active exercise tires her too much, massage can be used instead (see chapter 11), the breasts, the abdomen, and the veins being always avoided. Walking in the open air and the sunlight must be urged, though never, of course, to the point of fatigue. No golf, tennis, dancing, or swimming should be engaged in during pregnancy. Sewing on a sewing machine should be restricted.

The patient may go to lectures, concerts, *et cetera*, during the early months of pregnancy, but should not get into a crush. She should shun close rooms, especially those heated by coal, gas, or oil, because of the danger that the child might be injured by gas. She should not travel much, and when travel is necessary, should go in the most comfortable way possible. If there is a history of abortions, or a known tendency to such, travel should be prohibited. Long trolley or automobile rides may bring on premature labor, as may also riding on rough roads.

Mental Hygiene. A pregnant woman should not be subjected to mental strain or excitement. A quiet life is the ideal for her. Good reading, something elevating in its nature, is desirable. She should refrain from reading medical books. It is not necessary for her to acquaint herself with all the possible complications of pregnancy. She must not worry over her condition and her approaching labor, nor should she listen to gossiping neighbors who take pleasure in recounting difficulties and dangers of parturition.

If there is a tendency to melancholia, changes of scene are wise. There is a notion—quite old, too—that the woman's mind may have an influence on her unborn child; and it does in many cases affect the child.

Statistics tend to prove that the mothers of great men have been women of rare intelligence, high attainments, and religious devotion, and that fathers of exceptional mentality produce like offspring.

Many a mother worries over the thought that some shock or fright may have "marked" her child. Often the inquiry is made of the physician or the nurse as soon as the child is born, "Is he all right?" It is true that a shock or a fright may bring on an abortion or premature labor by causing hemorrhage in the placenta, and may so injure the milk of the nursing mother as to

produce convulsions in the infant. However, it is known that *maternal impressions do not affect the physical well-being of the child.*

The Bowels. Attention to the intestinal tract is important. About nine out of ten mothers are constipated during pregnancy, and it requires great effort and patience to overcome the habit. The following will greatly help:

1. Go to stool at a certain time each day. The best time is before breakfast. If there is no action, a glycerin suppository may be used, or a very small enema. The prospective mother should never strain, but should always go when nature calls.

2. Every morning after rising, and in the evening before retiring, drink a glass of cool water and eat an orange or an apple. Water should be drunk freely between meals.

3. The diet should contain fruits, and vegetables, such as spinach, peas, string beans, tomatoes, corn, and other foods of this kind. No tea nor coffee should be taken. Bran in the form of bran "krumbles" or bran gems may be eaten with the meals. Prunes or figs stewed with a few senna leaves are also helpful.

4. Every night, the patient can inject six or eight ounces of olive oil into the rectum by means of a hard rubber syringe. The oil soothes the mucous membrane of the bowels and allays the irritation there. In the morning, the bowels may move, or can be aided with a small enema.

If these rules prove insufficient, the following recipe will be effective: 1 pound prunes, 1 pound figs, 1 pound raisins, 1 ounce powdered senna. Remove stones from prunes, and grind all fruits together in a food chopper. Mix the senna thoroughly with the fruit, and make into little balls with the hands. This quantity makes one hundred balls. One or two taken at bedtime will have the desired effect.

If constipation persists, cascara sagrada and phenolphthalein are the best drugs to take. After a month's use, these should be alternated with Epsom salts or magnesium citrate used as directed in chapter 12.

Kidneys. These organs are weak spots during pregnancy, and therefore require watching. The urine should be examined by a physician every three or four weeks during pregnancy, and oftener if there is any reason to suspect trouble. Test should be made for albumin and sugar. The total amount passed in twenty-four hours is of utmost importance. It should be at least fifty ounces. Edema of the feet and swelling of the hands and eyelids are always significant, though they do not always come from kidney disease.

Toxæmia. There is sometimes found in pregnancy a condition due to the improper functioning of the internal organs, or improper elimination from the organs of excretion, which produces symptoms of vomiting, with persistent headache and dizziness. We call this condition toxæmia. It is serious if allowed to extend over any length of time, and should be reported at once to the attending physician.

Bathing. The skin is more active than usual during pregnancy, and requires more care. Avoid chilling, but keep up its function, is the advice given always. The patient should bathe daily, or often during the week. Cold bathing, cold showers, sitz baths, ocean bathing, and hot baths should be avoided. The tepid bath should always be used. Abortion has repeatedly been caused by surf bathing. Salt glows (see chapter 10) given in the bathtub are excellent, the salt being used in the hand for friction, and the skin rinsed with tepid water.

Care of the Genitals. Leucorrhea is common during pregnancy, hence bathing of the genitals to keep them free from irritation and avoid odor is indicated. Wise care must be taken in the use of public toilets. As the vulva is larger and more open, and more danger from contact with dirty closet seats exists, sanitary seat covers should be used away from home.

The breasts require care to fit them for the important function of lactation. For a woman to be unable to nurse her infant is a great misfortune, and no effort should be spared to prevent such a calamity. Care should be taken all through life to prevent injury to the breasts. During pregnancy, they should be washed daily with soap and water. If too heavy, they should be supported. The nipples should be anointed with cocoa butter. No hardening is necessary, but rather they should be kept soft and pliable. The nipples should not be compressed, as this flattens them, and thus they are not prepared for lactation.

Engagement of the Nurse. Obstetrical nursing requires higher skill than any other form of nursing, comprising, as it does, surgical, medical, and infant nursing. For this reason, only the best nurses should be engaged. Not every old woman who has brought up a family is skillful enough to take care of a case of obstetrics and give the required care to mother and infant. It is true that women do "get through" this ordeal, but they would be much stronger afterwards if properly attended at confinement.

DETERMINATION OF THE SEX

Endless theories on this subject have been brought forth; still nature hides the secret of the determination of sex. As far as

we know at present, the sex of the child has already been determined in the ovaries of the girl even before puberty, and therefore no influences during pregnancy can affect it. Whether a male or a female ovum is the one to be fertilized by the male element, seems to be a matter of chance. Yet the subject is by no means closed, and perhaps nature may give up her secret in time.

The question as to whether a male or a female child will be born is also beyond us. All statements regarding it are guesses. The rapidity of the fetal heart tones is used as a basis for one guess, the shape of the mother's body another, and the appearance of the mother's face still another. If the child's heartbeat is faster than 140 a minute, we say it will be a girl; if below 130, a boy. But we are often mistaken even then.

ABORTIONS

As the word "abortion" is sometimes suggestive of a criminal procedure, it is rarely employed in popular speech, all cases terminating prior to the period of viability of the child being designated as miscarriages. Among physicians, however, the latter term is seldom used, and they are accustomed to speak of all cases ending before the twenty-eighth week as abortions.

Spontaneous expulsion of the ovum may occur at any period of pregnancy, and technically it is designated according to the degree of development the product of conception has attained. If it occurs before the sixteenth week, it is customarily termed an abortion; if between the sixteenth and the twenty-eighth week, it is called a miscarriage; and after the twenty-eighth week, or two weeks before time for delivery, premature labor.

Causes: In the early months of pregnancy, the spontaneous expulsion of the contents of the womb is nearly always preceded by the death of the fetus. Therefore the cause of death must be considered. In later months, the fetus is nearly always born alive.

One of the most usual causes of death of the fetus is abnormal development, which would have produced a monstrosity had labor advanced.

All acute infectious diseases due to the transmission of the toxins, poisoning from illuminating gas, lead, *et cetera*, are other causes.

The most common cause is abnormal condition in the uterus, as chronic inflammation of the lining of the uterus, or displacement of the uterus, particularly retroflexion or prolapse. There are cases where more trivial things will cause an abortion, such

as tripping over a rug, a misstep, a ride over rough roads, or violent exercise.

Practically the only paternal cause of abortion or premature delivery is syphilis.

It is not unusual to meet women who give a history of repeated abortions or premature labor, occurring about the same time in a number of successive pregnancies. Careful examination by the physician commonly demonstrates the existence of an inflammation of the uterus or its linings, or a displacement of the organ itself. When repeated premature labors occur, signs of albuminuria, Bright's disease, or syphilis will in most instances be discovered.

Treatment: Preventive treatment is most important. When a history of previous abortions is given, extra care during that period should be exercised, all work being avoided that would in any way predispose to it. The patient should keep indoors, and recline on a couch or a bed, doing as little work as possible, and often none at all, till the usual time for the abortion to come on is past (which is, as a rule, the third month of pregnancy), and avoiding all exercise at the time for the menses to appear. If slight hemorrhage appears, absolute quiet in bed, with hips elevated or foot of bed raised, may prevent the abortion.

It is a fact that many a woman of the better classes searches out some low, unprincipled person who will perform for her a criminal abortion, destroying a life newly formed, committing a sin in the sight of Heaven, and violating the laws of our country.

In addition to the moral aspect of the question, there is always great danger to the life of the mother from induced abortions, and particularly those performed by ignorant persons and under conditions of secrecy.

Everything possible should be done to prevent any girl who has unfortunately become pregnant illegitimately, from seeking and securing the accomplishment of abortion, for it is a sin and a crime; but to induce her to seek, through a reputable physician, to find a haven where she may be cared for until after confinement, and where her child can be properly cared for. There are dependable agencies rendering such services.

EXTRA-UTERINE PREGNANCY

In extra-uterine pregnancy, the ovum is fertilized at some point between the uterus and the ovary, in the Fallopian tube. It is a rare condition, though it is found more frequently since its recognition has become easier, than in olden times. Normally the ovum passes down the Fallopian tube into the cavity of the

uterus, pursuing its further development there. If it is arrested in the tube and grows there, the tubal type of pregnancy results. Extra-uterine pregnancy is most commonly of this form, but it may develop in the ovary or even in the abdominal cavity.

This is a serious condition, almost every case demanding operation. There may be a few cases of spontaneous cure, as the ovum is discharged from its bed and absorbed, or dies and is changed into a hard, chalky mass.

The usual symptoms are those of pregnancy. The patient may have menses, but small in amount. Some pieces of membrane may appear with the menses. There is a sensation of fullness on the affected side. When rupture occurs, there are agonizing pains low down in the side, which may last for an hour or more, and there will appear signs of shock, nausea, vomiting, prostration, anxiety, pallor, rapid pulse, rapid breathing; and if surgical aid is not given, death results.

When these latter symptoms occur, which indicate internal hemorrhage, the patient should be put to bed; the bed should be elevated at the foot, an abdominal binder applied, and an ice bag placed over the abdomen while the physician is being notified. Send for a doctor at once, for an operation is inevitable.

DELIVERY IN ABSENCE OF THE PHYSICIAN

A physician should be in attendance at the birth of the child, and plans should be laid accordingly. In fact, a physician's care should be sought as soon as the condition is determined, for the prospective mother should be carefully watched throughout the period of pregnancy. It sometimes happens, however, that the family finds itself alone when the "party" is announced. The physician cannot always get there quickly enough. This is especially true if one is living in the country. For this reason, some little instruction on what to do at such times is in order.

Preparations for Delivery. Spread a liberal supply of newspapers over the mattress so as to prevent its injury by soiling. If a rubber sheet is to be had, use it for this purpose. Place a clean sheet over this protective covering. The patient will want to pull on something at one stage of labor, and the best way to fill this need is to splice a couple of sheets, and tie the free ends to the foot of the bed. Spread newspapers on the floor at the side of the bed. Boil a pair of scissors, and about three feet of strong string, or preferably narrow flat cotton tape.

Preparation of the Patient. Give a cleansing enema, and carefully clip the hair from the vulva. The enema should be given at the very beginning of labor, before the pains become hard and frequent. Wash the parts with soap and water, and

follow with one per cent lysol solution (1 teaspoonful lysol to a pint of water). Use small pieces of cotton or cloth, and throw each piece away as soon as it is used. Do not put it back into the soap and water or the lysol solution. Always wash downward, toward the rectum. While cleansing the parts, hold over the opening of the vagina a piece of the cotton or cloth, to prevent any of the soiled water from entering the birth canal. The patient should be on her back, with the knees flexed. The legs may be protected by clean stockings. Be sure that the bladder has been emptied. The room should be warm.

For the Emergency Attendant. The hands and the forearms should be washed thoroughly in soap and water, laundry soap preferred. A vessel containing a one per cent solution of lysol should be provided, and a number of large pledgets of cotton should be immersed in the solution. If the cotton is not available, and clean cloth is at hand, strips of the cloth, two inches wide and four inches long, may be used for the same purpose.

The attendant should prevent a too rapid birth of the head by holding against it during a pain, and one of these cloths or pledgets should cover the parts, the fingers of the attendant not touching them. The mother should not be allowed to pull on anything or bear down during the pain, and she should breathe rapidly through her mouth.

It should be the aim of the attendant to bring about a slow stretching of the opening, so as to insure a delivery with as little injury to the parts as possible. If delivery is according to the usual order, the head will appear first. Try to deliver it between pains; this may save a bad tear. Immediately after delivery of the head, pass the fingers to the neck, to determine the possibility of a loop of umbilical cord around it; and if such is found to be present, slip it over the head. If it is too short to allow of this maneuver, tie it at once with the boiled cord or string—twice—and cut it between the ties.

Help the shoulders through by light traction on the head if necessary, the upper shoulder appearing first, aided by pulling downward, followed by the lower shoulder, aided by pulling upward. The rest comes quickly.

As soon as the head is delivered, some one should place a hand above the uterus and follow it down as the child is born. The top of the uterus should be held in the palm of the hand, with the thumb over the anterior surface, and the fingers pressed down toward the spine until it can be distinctly felt with the end of the fingers.

If there is no hemorrhage and the uterus remains hard and firm under the hand, it is not massaged or manipulated in any way.

If it becomes relaxed and soft and hemorrhage occurs, the uterus is massaged by keeping the hand in the position described, and moving or "wiping" the abdominal wall round and round over the uterus.

If bleeding occurs at any time following the delivery of the afterbirth, this same method is used to check the hemorrhage. In cases of severe hemorrhage, large towels wrung out of very cold water are applied to the lower abdomen and the inner side of the thighs.

In normal cases, the afterbirth will be expelled in ten to thirty minutes. The patient will have a light pain as the uterus contracts, and she should bear down with this pain. At the same time, the attendant makes gentle but firm pressure with the hand on the abdomen. If these attempts of the patient and the attendant fail to bring the afterbirth, and there is no hemorrhage, let the patient wait several hours, if necessary, for the arrival of the doctor.

Never pull on the cord to try to bring the afterbirth.

When the afterbirth is expelled and the membranes still remain in the uterus, take the afterbirth in the hand and pull on it very gently, so that the membranes will not be torn off and left behind. Sometimes the afterbirth can be grasped and turned round and round, thus twisting the membranes into a cord, and preventing their being torn off.

Always save the afterbirth and the membranes for the doctor to examine.

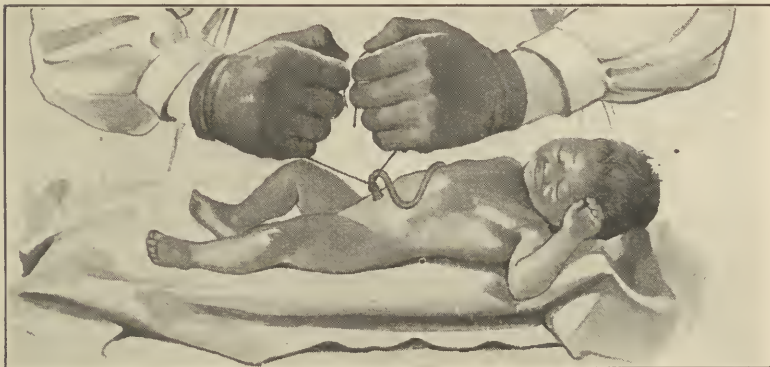
Clean the mother up; put a clean pad over the vulva (preferably one that has been sterilized); apply a firm binder around the abdomen, to assist in holding the uterus down, and a T binder over the pad, and make her comfortable.

Care of the Baby. As soon as the child is delivered, let some one take it in charge. It should begin to breathe at once, and if it does not respond to the stimulus of room temperature and handling, it should be held up by the heels and spanked. Be sure to have a good hold on the child before attempting any manipulation. If necessary, movements of artificial respiration may be given the child by compressing the chest through a doubling up of the body. This should be repeated at the rate of about twenty times a minute. If this fails, the child may be dipped alternately in tubs of warm and cold water; but should this be necessary, the cord must first be tied. In event the mother and the child are both in good condition, it is best to wait ten or

twelve minutes before tying the cord, so as to give the child the advantage of the extra blood it will secure from the afterbirth.

Tie the cord about one half inch from the body, with tape that has been sterilized, and again about one inch from the first tie, and cut between the ties with the sterile scissors. Anoint the stub with alcohol, and apply clean dressing, preferably sterile. The baby should be carefully cleaned with a cloth and sweet oil, and a firm binder applied.

After Care of the Mother. A goodly supply of boiled water should be on hand. After each movement of the bowels or passage of urine, a small quantity of this sterile water, warm, should



Tying the Umbilical Cord

be poured over the parts, and a clean pad applied. Give an ounce of castor oil twenty-four or thirty-six hours after delivery. The bowels may be kept open with enemas or teaspoonful doses of aromatic cascara after this initial cleansing.

The diet should consist of fluids for the first day—strained soups, gruels, milk, and so forth; a soft diet for the following three or four days, with a gradual widening of the dietary from then on, care being taken to avoid foods which experience has taught will give the baby colic.

The mother should be kept in bed for ten days. She should spend an hour or so a day during this period on her abdomen to assist Nature in the readjustment of the organs to their proper position. Soap washes should be given her as needed, and an alcohol rub every day for comfort's sake. An occasional fomentation to the spine, and rubs to the spine and legs will be acceptable at times. Her temperature should be watched. It should be normal on the third or fourth day. If she shows a rise in this period, a physician should be consulted at once,

The Baby

The newborn baby is certainly not an object of beauty. Even its mother could hardly think it is, did she see it at the moment of its birth, before it has had its first toilet made, wet and more or less covered, as it is, with a peculiar whitish, waxy substance called vernix caseosa. Olive oil or some other oil will cut this waxy substance, and it can be wiped off, so the body will be smooth and clean. Even after the child is dressed, its appearance cannot be called altogether beautiful. Still, despite its lack of beauty, its mother loves it, and is naturally anxious to know whether it is "all right."

A healthy newborn baby should be plump and fat, with extremely soft and delicate skin. This softness is due to fine down over the body, which is scarcely visible, but sometimes quite abundant. The skin is of a decidedly reddish color; and only when the baby is suffering of disease, or when it is cold, does it become mottled and bluish. Cold is the most frequent cause of this, for a baby has feeble vitality as compared with an adult.

The usual weight is seven to seven and a half pounds, although some are lighter in weight and some are heavier. Its length is about nineteen or twenty inches, with a range from sixteen to twenty-two inches. Any child within these limits of weight is accounted normal. Some children are thin when born, yet not unhealthy.

When the child is about a week old, its red color fades into a yellowish tint, which is caused by the presence of a slight degree of jaundice. This is a common occurrence, and not regarded as an evidence of disease. In this first week, the long down falls off, and more or less shedding of the skin in the form of fine scales or shreds takes place. This shedding lasts a week or more. Before the baby is two weeks old, the yellow tint has disappeared, and the skin has taken on the real "baby" character, which is so much admired, and which needs to be seen to be appreciated. It is then clear, soft, of a rose pink tint, with the palms, the soles, and the cheeks a deeper color.

The head is remarkably large as compared with the rest of the body, being nearly as long from the crown to the chin as is the trunk. Immediately after birth, if this has been difficult or prolonged, the head is sometimes found squeezed into a shape that is startling; but it will soon shape itself properly.

There are two soft spots on the head, called anterior and posterior fontanels. The one just back of the forehead is the larger of the two, and is the only one to which the mother need give much attention. It is somewhat diamond-shape, and should measure at birth about one inch in diameter. It should neither be depressed nor bulge much.

The newborn baby sometimes has a very considerable amount of hair on its head. This falls out to a great extent in a short time. Its nails too are well formed at birth, and fully grown out to the end of the fingers.

The tongue, during the first week of life, and often till the third month, has a whitish fur over its surface. This is not a sign of digestive trouble, but is probably the result of dryness of the mouth, due to absence of saliva.

The chest of the baby is poorly developed as compared with the head, and its circumference is somewhat less. The shoulders and the hips are narrow, their girth at first being less than that of the head. The abdomen, on the other hand, is large and prominent, because of the extraordinarily large liver the newborn child possesses. The arms are comparatively short, and the legs particularly so. Every mother should remember that the baby has crooked legs at first, or rather they seem crooked. It has a peculiar way of turning its feet to bring the soles together. There are cases of bowed legs and clubbed feet, but these are real deformities of joints and bones. The face of a young babe, when it awakens, has an expression of wondering surprise. The look of intelligence is only an apparent one. It is a pity to shatter a mother's fancy that her child notices what is going on, recognizes her, and expresses pleasure at her approach. The truth, however, is that the baby at birth is about as sensitive as the leaves of the sensitive plant. The baby automatically closes its mouth and nurses without knowing that it does so.

The color of the eyes is very indefinite at first. All babies have eyes of a sort of blue color. The change of color to lighter or darker hue occurs at the sixth or eighth week. When a baby of any age is asleep, the eyes are entirely shut, and the expression is that of peaceful repose. The position of its body is that of entire and graceful relaxation. The head is turned to the side most of the time. Breathing goes on imperceptibly and without any movement of the nostrils. Its hands usually lie upward near its face, half closed. As soon as it wakens, the hands and the feet are in almost constant motion.

The first act of a newborn baby is to cry. No other sound is so welcome to the attending physician as a lusty cry from the little newcomer, for this shows that the lungs, which hitherto

The temperature of a baby need not be taken daily unless the little one acts strangely or its skin feels hot. The mother should acquaint herself with the clinical thermometer and how to use it. One should be in every household, to be used in case of sickness. The figures are somewhat hard to read when a person is not accustomed to them, but a little practice soon helps. The thermometer should be carefully shaken down till the mercury stands at 95° . Then the bulb, after being oiled, is inserted in the rectum. This is the most accurate way of taking the temperature. It may be taken in the armpit, but never in the mouth. The temperature is normal at 99° during the first week or more of life. Later it settles down to 98° to 99° , as in the adult.

BABY'S DEVELOPMENT

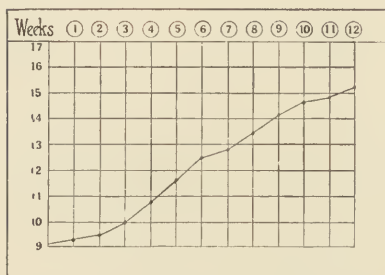
Fortunately the baby grows. What mother will forget her happiness at the first tooth, the first step, and the first word! All this progress comes gradually. By this growth is meant its increase in size and weight; and these changes are as remarkable as other bodily characteristics. To watch its mental development is most interesting, if we really appreciate just what baby knows and just what it ought to know at different periods of life.

Besides simple growth, new acquisitions appear, such as teeth, tears, saliva, and ability to walk; and still other changes go on which are not visible, such as alterations in the digestive process. When baby is first born, it has little control over its body. It lies where placed. It soon learns to use its arms and legs, and when awake, keeps up a series of gymnastics. At about two months, it has power to hold its head up, and by three or four months, supports it well. When about six months of age, the little one tries to stand if held by mother in her lap, and will try to put one foot before the other. Creeping begins from the seventh to the ninth month. Then the child raises itself by holding on to furniture, and is soon able to take a few steps with help.

There is no exact rule as to the time for creeping or walking. Some children acquire these new powers earlier than do others, and the way the creeping and walking is done varies with the child. Some creep on hands and knees; others never use knees, but take a position on hands and feet; others sit and push along with one hand backward, shoving themselves along. A mother should be in no hurry about the walking. Fifteen or eighteen months is quite early enough. Some even wait till two years and still are healthy children. Longer delay than this, however, should arouse suspicion that something is wrong.

With the increasing power of motion comes the development of the senses. When about six weeks old, the baby fixes its eyes on objects, quickly shutting them if something is moved in front of them. At the age of two months, its vision is more perfect, although it cannot manage the motion of its eyes, often looking cross-eyed at objects.

Hearing and smelling develop rapidly; and within the first weeks, baby will waken at noises around it. It does not notice the character or direction of sound till about two or three months old. Musical tones gradually are recognized, till finally the baby tries to sing, and prefers one tune to another when the mother sings to it. At the age of three months, it has a pretty clear idea of



From Tuley's "Pediatrics"

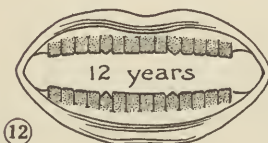
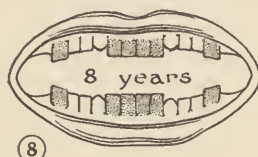
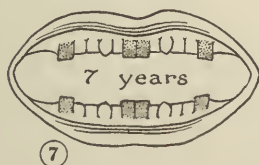
Normal Weight Chart for the First Twelve Weeks of Baby's Life

its mother, and seems pleased at her approach. It enjoys bright objects. Even before three months, it is soothed by handling and even by talking. When four or five months old, it recognizes its friends, and plays "peep-po"; and it makes expression of its likes and dislikes by gestures with its hands and muscles of its face.

About the age of six months, the child begins to make peculiar sounds as though talking. Usually its

first word is "mamma" or something like it. The mother believes the baby means her. At eight or ten months, the child can say "papa" and "mamma" more plainly, and often some other words, and really means them. The child gradually gains control over the passage of urine and movement of the bowels. Much depends on its training in the early months. Some children gain complete control over these organs in the very early months, through the careful management of the mother, so that only for covering is the wearing of diapers necessary. "Holding out" is a good practice, for the baby soon learns the plan and adapts itself to it.

As a rule, the child loses weight the first week; and at the end of the first month, it should have gained about an ounce a day. In the second month, it gains one ounce a day; and in the third and fourth months, about five and one half ounces a week—that is, three quarters of an ounce a day—so that at five months of age, it has doubled its original weight. From the seventh to the twelfth month, it gains one pound a month. In the ninth and the eleventh month, the gain lessens somewhat.



Teething chart. The shaded teeth are permanent ones.

The gain in length is about one inch a month, up to the fourth month; then half an inch a month, up to one year. During the second and third years, the gain is four inches.

The teeth begin to appear at the fifth or the sixth month, the lower ones appearing first. The milk teeth, or temporary set, numbering twenty, are commonly all in their places at the age of two and a half years. At six years, the permanent teeth begin to come in. The mother should be on the watch for these teeth; for they are molars, and they may cut and decay before she is aware of their presence in the child's mouth. The milk teeth fall out, and permanent teeth take their places. The order is uncertain, as it varies with different children.

BATHING

The first bath is usually the work of the nurse. It is completed as quickly as possible, sweet or olive oil being warmed to the body temperature and rubbed over the entire surface of the child's body. The body is then wiped carefully with soft linen until all the waxy substance is removed. For this first bath, soap and water are not ordinarily necessary. Water for succeeding baths should be about 100° F. To determine the temperature, use a water thermometer, not depending upon the hand as an indicator. The baby may be laid on the lap, or better still, on a table suitably protected by an old soft blanket or towel. Soap for the bath should be applied with the wash cloth, which adapts itself to the folds and the creases better than a sponge. The body is then rinsed with warm water, and dried carefully by "patting"—not rubbing, as the skin is so tender. As soon as the cord is off, which should be in four or five days, the bath can be given in a baby bathtub. After the soap has been applied, lift the child into the tub by taking hold of legs and back of neck, supporting the neck with the left hand while the right is left free to complete the bath. When the bath is over, the baby is lifted into a flannel or Turkish towel. With a rubber protection underneath, this makes a very soft covering for the little one. The towels used to dry it with should be warm and soft, and the finishing touches may be made with dusting powder in the folds and hollows of the body.



Water Thermometer

Sudden plunging of the child into water should be avoided, and the head should not be submerged. If fear of the bath has been acquired, it can sometimes be relieved by placing a blanket over the tub and slowly lowering the child into the water in this; or the child may be put into the empty tub and allowed to play in it till accustomed to it, then the water added gradually.



Bathing the baby. Note the manner of holding the infant.

Water for baby's bath should be soft. Hard water will make the skin rough. The best soap for the bath is Castile, although good glycerin soap may be used.

CLOTHING

It is very important that the clothing be warm and soft, and at the same time, light in weight and texture. The old-time custom of dressing babies in very long garments is a pernicious one, because of the excessive weight hanging on the little one's hips, and also because of the extra tax on the mother in the making and laundering of the garments. Plainer clothes of soft texture are much more sensible.

In nearly all seasons of the year, the little woolen or part woolen shirt is essential. A young babe is harder to keep warm than an older one, because its vitality is lower, and it is in a colder "climate" than before. The bands may be made of flannel or flannelette, and should be worn till the child is old enough to use a knit binder that fastens over the shoulder. Many cases of diarrhea might be avoided if the band were left on till the child is older.

All the petticoats and dresses should hang from the shoulders. Little waists can be made and sewed on the skirts which will support them from the shoulders. All dresses for a babe should be laundered without starch, as trimmings to little clothes that have been starched are rough and stiff, and frequently rub and irritate the tender skin. Sleeping garments should be made long, with a draw string in the bottom, to cover the feet.

There are many sets of patterns sold for babies' garments, and most of them are very practical. Some advise the disuse of buttons and safety pins, using tape for tying every garment. These garments, especially the outer ones, are not as artistic as the little gowns made with tiny buttons. We leave this matter to the mother, but beg her to simplify the outfit, in order to save her time for more useful duties than the endless fine stitches and embroideries in baby's clothes. The little one will be just as sweet and happy in the clean, simple garments.

THE NURSERY

Every home should plan a room for the children's room, or nursery, one which can be heated and ventilated well, and can be used for their play room. It should be bright and airy, with the walls tinted or painted some light color—never papered, for sanitary reasons. This room should be planned with reference to sickness as well as health; for even with the utmost care, children will "catch" diseases.

All eruptive fevers must be isolated; and unless some room in the house is provided for such cases, all the family are exposed. It is not necessary for every child to have such a disease, even if one in the family does have it.



Drying the Baby After His Bath



Abdominal Binder

The exposure of such a room should be to the south. A corner room with windows opening south and west is ideal. In warm weather, the blinds on the windows can be drawn, or awnings can be used to shade them from the bright rays; but the winter weather is greatly modified by the sun from the south and the west.

No carpets should be placed on the floor. (See chapter 47 on precautions against tuberculosis.) Only small, washable rugs should be used. In this way, everything can be kept scrupulously clean. All furniture for the nursery should be strong, light, and plain, so that it can be dusted or washed. Small, low tables and chairs are needed for the children to take their meals at and sit at with some of their toys.

Tall screens with washable fabrics are very serviceable for cutting off light and drafts. Pictures of an interesting and instructive nature should grace the walls.

When the child is sleeping in the daytime, the room should be darkened. It is not a good plan to accustom a babe to too much quiet, because then it will be so easily disturbed by any noise. The child will sleep longer, however, in a darkened room; and much depends on its naps for its "good nature" the rest of the day.

FEEDING THE BABY

Last but not least in the care of the baby is its feeding. We all grow by what we digest, and this is particularly true of an infant. There are distinctly two classes of feeding,—by the breast of its mother or of a wet nurse, and artificially from a bottle.

Fortunate is the child who can have its own mother's milk until old enough to be weaned. True, the demands on a nursing

mother are great as far as strength and vitality are concerned, also as to her time and freedom; but what real mother would not make the sacrifice?

The fundamental importance of breast feeding of infants can hardly be overemphasized. Undoubtedly many mothers are persuaded to give up breast feeding and put the baby on a bottle when it is entirely unnecessary, and often the physician is influenced in his advice by insufficient reasons. A realization of

the absolute necessity for breast feeding for the maintenance of health and resistance to disease will in most cases make it possible to find a way to continue at least partial feeding from the breast, even though this must be supplemented by artificial food from a bottle.

Careful investigation has shown that the breast-fed infant not only has a much better chance to live and successfully combat the diseases of infancy which attack it, but is stronger and healthier in later life.

In those cases where artificial feeding, either in whole or in part, becomes imperative, the fact should be remembered that cow's milk in its natural condition cannot be handled successfully by the baby's di-



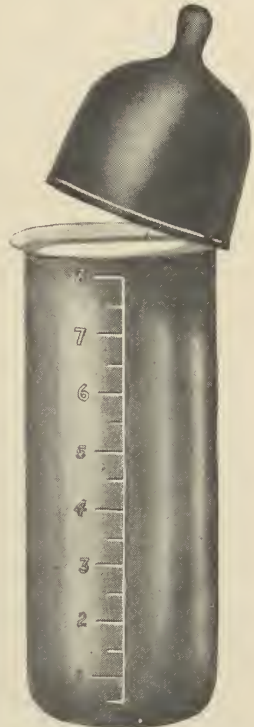
The Correct Way to Hold a Baby

gestive organs. It must be diluted with sterile water (water that has been boiled), and have the sugar content increased by the addition of suitable material. Specific directions for the preparation of the milk should be given by the physician, or by the attendants at a baby welfare station, or a visiting nurse trained in this work.

It is often a good plan, where the breast milk is insufficient in amount, to give both breasts to the baby at each nursing, ten minutes at each. When the bottle is used in addition to the breast feeding, it should immediately follow, and not be given before the breast, as otherwise it will often interfere with the breast nursing.

In many cases, nursing is discontinued for inadequate reasons. The occurrence of menstruation is not a reason for stopping the nursing. Early pregnancy is not a cause for immediate weaning; but bottle feeding should be gradually added, and nursing stopped when it is evidently a drain on the mother. An attack of an acute infectious disease in the mother does not make the weaning of the baby necessary. Cover the mother's face with a gauze mask, and take other precautions to protect the child, and let it nurse unless the drain on the mother is too great. In wet nurses, the milk of the mother of an older baby is not necessarily injurious.

It is natural for babies to suck, and the first lesson in taking the breast is not a difficult one. The practice of early nursing is beneficial for the mother, for it stimulates contractions of the uterus; and the child gets from the breast the fluid substance before the milk comes, which stimulates the intestinal tract, so that the waxy meconium may move from the bowels before the third day, when the breasts fill with milk. Before the milk is established, nursing every five hours is sufficient. It is not a good practice to give sugar and water, gruels, *et cetera*, to babies before the milk comes. This often is the beginning of colicky days. Plain warm water is satisfactory ordinarily. Most infants sleep nearly all the time for the first few days, and need little to satisfy them. When the milk comes in the breasts, regular feeding should begin. Most babies do well on a three-hour schedule. Few physicians to-day advise feeding every two hours. A baby soon becomes a slave to "bad habits," and but a remarkably short time is required to get these habits well developed. They early get to sucking their fingers or thumbs. Also they learn that a little crying will bring mother, and they cry till she takes them up. They also turn night into day, sleeping all day, and lying awake and crying nearly all night. They have to be disciplined from the first, and form the habit of regular nursing and regular, sound sleep. Early in the second or third month, they can be taught to sleep all night after the ten o'clock feeding.



This type of bottle is the only suitable one, from a sanitary standpoint.

The Mother's Task. The mother too has to go through a process of training. She must have regular rest. Her food must be nourishing and abundant to supply the little one. It is necessary also for her to guard carefully her appetite. There are many foods she has been accustomed to eating before, that would give great discomfort to her little one through her milk. All gas-forming vegetables would do so, such as cabbage, turnips, onions, beans, and peas. There are many mothers who cannot use any vegetables except fresh lettuce for the first month, having to limit their diet to bread, cereals, milk, cream, eggs, and sweet fruits. The result is so satisfactory that the sacrifice by the mother is not considered great. The baby simply sleeps and eats. We often hear a mother say, "We hardly know we have a baby in the house."

There are also cases in which the most careful dietary by the mother yields milk that produces colic almost as soon as the child nurses it. This is true when the mother has indigestion and is nervous and fretful. Again there are cases where the supply of milk is insufficient in quality or quantity, and the child cries because it is not satisfied. Violent anger, fright, worry, nervous excitement, late hours, *et cetera*, all tend to the production of poisonous milk.

Weaning. Eventually the baby has to be weaned, and it then ceases to receive human milk. This should be done when the child has five or six teeth, or when it is developing well and the mother is showing that it is a drain on her physical strength. She may have an abundance still, but the child drags on her. The average time for weaning is when the child is about one year old. When it has teeth, it can eat if the proper foods are given it to eat. The exact age depends on the child and the mother's condition, also on the time of year. If the mother is supplying a small amount of milk, or the quality is inferior, mixed feeding—that is, a combination of bottle feeding and breast feeding—can be arranged. When the mother must wean from her breast, the bottles are gradually increased.

It is usually better, when weaning a child, to accustom it to a spoon in feeding, and a glass or a cup for drinking. This prevents the bad habit in a child of carrying its bottle and nursing it, even when walking everywhere.

ARTIFICIAL FEEDING

All mothers should know certain facts that cannot be too often reiterated:

1. Mother's milk is the best food for a baby; there is nothing "just as good."

2. The common idea that mother's milk is often poisonous to her baby is not true.

3. A mother should not wean her baby because her milk supply is scanty. Rather, she should add to the little food supply she has, some appropriate nutriment to supplement it. This is best done by giving a food mixture after the baby has nursed as much as possible from the failing breast.

Substitutes. When, for some definite reason, a mother cannot nurse her baby, the best substitutes are, in the order named:

1. Fresh milk from tuberculin tested cows, produced in such a way that it is clean, free from bacterial contamination, and of average composition.

2. Next comes goat's milk produced under the same conditions.

3. The dried and condensed milks that are unsweetened.

4. The various baby foods that flood the market.

Methods. A few simple rules will indicate to a mother how to feed her baby, if he is of normal size and weight.

A baby, if a boy, should weigh about seven and a half pounds at birth, and should be twice his birth weight at six months, and three times his birth weight at one year. Girl babies weigh about seven and a fourth pounds at birth, and the ratio of increase is the same as with the boy babies. The weight for each at six months should be about fifteen pounds.

There are two principal systems of planning artificial feeding for babies,—first the *caloric* method, and second the *percentage* method.

The *first method* depends upon the heat unit, or calorie; and it is assumed that a baby needs food giving him each twenty-four hours a certain number of heat units, proportionate to his weight in pounds. This averages forty-five calories a pound each twenty-four hours for the first three months of life, forty-two a pound during the next three months, and forty a pound from six months to one year. The caloric value of different foods being known, the requirement may be calculated.

The *second method* assumes that mother's milk contains the proper percentages of food constituents for the human baby—that is, of fats, proteins, and carbohydrates, or sugars—and attempts to arrange a food that imitates mother's milk in those percentages. This is done by the suitable modification of some one of the foods mentioned above,—cow's milk, goat's milk, *et cetera*.

A proper admixture of the two theories, each checking the fallacies of the other, will give the best results.

Time of Feeding. *From birth to three months:* Every three hours in the daytime, and twice at night, once at 10 P. M. and again at 2 A. M., as soon as possible dropping one of the night feedings.

From three to six months: Lengthen the feeding time to three and a half hours, and then to four hours.

From six months to one year: Every four hours, with only one night feeding.

Amount at Each Feeding. Begin with three ounces, and at the end of one month give three to four ounces, and continue to give from one to two ounces more than the number of months of the baby's age, but never more than eight ounces of liquid at any one feeding. Above all things, be regular in the feeding time, and do not hesitate to wake baby up in the daytime to receive his ration.

How much milk is needed to supply the growing bones and muscles and to offset the waste that is expelled by all living beings? From one and a half to two ounces in each twenty-four hours to each pound of body weight. For example, if he weighs ten pounds, he must have from fifteen to twenty ounces of cow's milk in twenty-four hours. Some babies whose nutrition is seemingly similar, will vary markedly in the amount of milk needed to keep up the proper nutritional status. The above quantity of milk will supply the needed amounts of protein and fat, but does not contain sufficient sugar (carbohydrates). Computation will show that this amount of milk and sugar is equivalent to 280 calories, slightly less than is demanded by a child of this size.

Constituents of Milk. The percentage of fat, protein, and carbohydrate found in the different baby foods is as follows:

	Fat %	Protein %	Carbohydrate %
Mother's milk	4	1.25	7
Cow's milk	4	3.5	4.5
Goat's milk	4	3.5	4.5

It will be noted that goat's and cow's milk may be used in the same manner in making the modifications, as they are similar in composition.

As will be seen from studying the above table, the sugar (carbohydrate) of mother's milk is much in excess of the sugar in cow's or goat's milk. Therefore sugar in some form must be added to make up the difference. Three sugars are available: milk sugar, which is the form in mother's milk; cane sugar, familiar to all because of its frequent use at the table; and malt sugar, which comes to us mixed with dextrin, which is soon

converted into sugar in the stomach and bowels. It is the author's experience that of these three sugars, maltose, or malt sugar, is the best, and next comes milk sugar. Cane sugar is not recommended. For the first week of baby's life, add to the formula two level tablespoonfuls of malt sugar or one of milk sugar. Gradually raise this amount to four level tablespoonfuls of the first or three of the second, until the baby is ten pounds in weight; then increase to five and finally six of the malt sugar, or four or five of the milk sugar. Do not feed the baby more than this amount, whatever the weight.

Sample Formulas. We are now ready to study some sample formulas in a practical way. Before we do so, a note of warning must be sounded. In beginning the feeding of any baby, we must remember that he is not used to the new food, that its protein comes from an animal of another species, so that it is best to prepare a food whose percentage of fat, protein, and sugar is less than the percentages in human milk. Give this food to the baby for a few days, until such time as he is used to it; then raise the food value to the theoretical requirements, until the baby gains in weight. Our first and only desire is to produce plump, healthy, well boned and muscled babies.

Baby A is one week old, he weighs seven and a half pounds, and he is firm and healthy. His mother cannot nurse him. His schedule should be as follows:

Number of feedings in twenty-four hours, 7.

Amount at each feeding, 3 ounces.

Time of feeding, every three hours in the daytime, and every four hours at night.

Total amount in twenty-four hours, 21 ounces.

Calorie needs ($7\frac{1}{2} \times 45$ calories), 337 calories.

Percentage needs, same as mother's milk.

Amount of milk needed ($1\frac{1}{2}$ ounces to each pound weight, or $7\frac{1}{2} \times 1\frac{1}{2}$ ounces), about 11 ounces.

Amount of sugar to be added to the milk, $\frac{1}{2}$ ounce.

The formula reads:

Milk	11 ounces
Sugar	$\frac{1}{2}$ ounce
Boiled water	10 ounces

Feed three ounces of this mixture every three hours.

This is equivalent to 280 calories, which is a little less than the 337 calories required by a child of this age. How about the percentage? Without going into a discussion of the theory, let us say that the percentage of fat is, roughly, 2; of protein, 1.75; and of sugar, 4. Remembering what was said about imitating mother's milk, we see that the protein is too high, and the fat

and the sugar are too low; but we are now endeavoring to feed a food that will agree with the baby. Therefore it would be better to dilute the milk still more and create a formula that will more nearly approximate the protein percentage of mother's milk. Practically, then, the best formula to begin with is the following:

Whole milk	7 ounces
Sugar	1 ounce
Boiled water	14 ounces

This formula gives a percentage of protein of 1.16, of fat 1.33, and of sugar 4, and a total heat unit value of 200 calories. If you do not care to study the theory as here outlined, then simply begin your baby with this formula. We will assume that it agrees with baby A; that is, he has no colic, and the stools indicate that the food has been well digested. About two days' trial will be required to discover this, at the end of which time an ounce of milk and another tablespoonful of sugar should be added, and an ounce of water taken out. In two days more, another ounce of milk should be added; and an ounce should be added each day until the food is up to the theoretical standard established in the preceding paragraphs. When the child is taking one and a half ounces of milk to the pound weight, and four level tablespoonfuls of sugar in the form of dextromaltose, or three of milk sugar, he should be gaining in weight. At one month, he should weigh eight pounds and ten ounces, and his formula should be approximately as follows:

Milk	13-17 ounces
Sugar	1 ounce
Water	15-11 ounces

Four ounces should be given to the baby at a feeding, and this amount should be continued until he is three months of age, at which time his formula should be increased to five ounces at each feeding.

Baby A is now three months old and weighs approximately eleven and a half pounds. His formula now should be the following:

Number of feedings	7
Amount at each feeding	5 ounces
Total amount	35 ounces
Whole milk	17-22 ounces
Sugar	1-1½ ounces
Boiled water	18-13 ounces
Caloric requirements	483
Calculated caloric value of formula	460-620

Gradually increase the amount of milk and the total amount of food to keep pace with the age in months, until your baby is six months old, when he should weigh fifteen pounds, and his formula should read:

Number of feedings	6 or 5
Amount of each feeding	7-8 ounces
Total amount	42-40 ounces
Time	Every 4 hours
Whole milk	22½-30 ounces
Sugar	1-1½ ounces
Boiled water or a cereal decoction	12-19½ ounces

This cereal decoction is made of oatmeal, barley flour, or cream of wheat, by using one tablespoonful of any one of them, and one pint of water, cooking three hours in a double boiler, and adding water to make up the amount boiled away.

Continue to increase the food in the same way, never giving more than one quart of milk in each twenty-four hours, until the baby is eight months old, when he should be taking whole milk. At this time, other foods may be started, such as cream of wheat jelly, oatmeal jelly, or boiled rice. All these should be cooked three hours, and given in small amounts to start.

In artificial feeding of babies, especially if boiled milk or preserved milk of any kind is used, a certain amount of orange juice or juice of fresh or canned tomatoes should be given daily, to supply the amount of vitamins needed.

CARE OF SPECIAL ORGANS

Eyes. Most states require the nurse or the physician to drop one drop of a weak solution of silver nitrate, or similar solution, in the baby's eyes at birth. The eyes should be washed daily with boric acid solution. If they are not taken too early into bright light, these directions will keep them all right.

Nose. Babies cannot "blow" their noses, and often considerable mucus collects in their noses. This can be easily removed by twisting a piece of absorbent cotton tight, dipping it in vaseline, and putting this up the nose. The particles of mucus will come back with the cotton, and the child will breathe better.

Ears. Baby's ears should never be cleaned with a wire hair-pin. Twisted absorbent cotton is usually as effective in the ear as in the nose.

Privates. The privates of a baby should be bathed carefully daily, and with some children, several times daily, to prevent their chafing. With little girls as well as boys, this is important. The foreskin of the male child should be pushed back and bathed daily. Care in this matter often prevents masturbation later.

The Sick Baby

The problems are great for the mother or nurse caring for an infant in health, but they are tenfold greater when the little one is sick. Babies are so helpless, because they have no way of expressing their feelings except by crying. For that reason, every mother should know the different cries of her baby. The cry of hunger stops when the child is satisfied with food. It is not a pitiful cry, but a teasing one, demanding attention. The cry of pain is sharp, shrill, and does not stop until the pain is relieved. It may be palliated by lifting the babe up for a moment; not fully, however, till relief comes. There is a peculiarly sharp, shrill cry in meningitis; and a characteristic grunt is heard when a child has pneumonia. Every mother should study into disease conditions, so that she may be ready in an emergency to give necessary aid "till the doctor comes." In mild cases of illness, she could often save the expense of a doctor's visit by putting to practical use her knowledge thus gained.

A sick baby may be more restless than usual, and more fretful, wishing the mother to hold it constantly. On the other hand, it may not wish to be handled at all, only desiring to be let alone. In such cases, the little one lies quietly, with the arms at its sides, the mouth opened slightly. The tongue, which in health is up against the roof of the mouth, is now lying in the floor of the mouth. Breathing is quicker when fever is present, the skin is hot, and the lips are dry.

GENERAL RULES FOR THE MOTHER

It is not supposed that every mother should be a doctor; but she should know when the baby is sick, and apply simple treatment for its relief. A few general rules can be given for her to follow:

Water-Drinking. If the child has fever, plenty of water should be given. For young infants, the water should be warmed to about the temperature at which the little one ordinarily takes its milk. For older children, cold water may be given. A short fast is a good treatment for any child when ill. Withhold its food and give water for several hours.

The Bowels. See that the bowels move freely. If there is any inclination to constipation, a warm enema will usually greatly relieve them. Every mother should know how to give an enema to her child, because it affords much quicker relief than

a purgative that must travel the whole intestinal tract. The little infant syringe can be used; but it holds so little water, and air is so easily forced into the intestine this way, that we would recommend the siphon syringe instead. A two-quart can or bag can be purchased, with a long rubber tube and several small nozzles. The smallest size is used for baby. If this is vaselined well, and is carefully inserted, it produces no discomfort.

The water should be about 101° F., with one teaspoon of salt added to one quart of water. Before inserting the tube, allow the water to run through it; and let the water run while inserting the tube. Have the can



Enema Outfit, with Catheter in Place of Rectal Tip

or bag hanging one foot above the baby's body. If it is too high, the pressure is great, and the water is forced in too fast. The entire quart may be passed into the intestine of the child, because it keeps only a small amount at a time, and then expels it quickly, seeming to know what the whole process is for. With every expulsion of water comes gas, which relieves the child at once.

It is even better to use a No. 16 French or No. 8 English urethral soft rubber catheter. This ought to be washed well and placed on the hard rubber tip of your enema outfit. After passing the warm water through the tube nozzle and the catheter, insert the catheter about five inches, having it well covered with pure vaseline first, using no force in putting it in the rectum. This rubber, being small and soft, can do no harm to the tissues, but will bring the desired result. The child should be placed in the recumbent position, the head and shoulders slightly elevated.

Suitable protection, such as paper or rubber sheeting, must be placed around the child. The enema may leave some water in the bowel, but this is readily absorbed.

This simple treatment—the enema, free water-drinking, and the withholding of food for from twelve to twenty-four hours—is one that every mother should know how to give; and it could be applied in the first stage of nearly every sickness. It is well to remember, however, that a long fast is not good for children.

Poultices. When the doctor comes, he may order heat in the form of a fomentation or a poultice, or cold in the form of a compress or an ice bag. Poultices are much more practical for babies, as they hold the heat well, yet do not blister. The

flaxseed meal and ginger poultice is best for babies. This is made of equal parts of flaxseed meal and ground ginger, mixed with warm water. When the consistency is that of thin mush, spread on a cloth the size required, cover with a cloth of thinner texture, and turn the edges in and sew them together to prevent the poultice from running out. When poultices are to be used, two should be made at the same time, so they can be applied alternately. A small steamer can be used to keep them moist and warm. If there is no steamer in the house, one can be improvised by setting a colander over a kettle of warm water and covering it with a tin cover or a pie tin. If there is no colander to be had, a tin can, washed well, with holes made in the bottom, will answer for a steamer temporarily. One poultice should be kept in the steamer while the other is applied, and *vice versa*. For bronchitis, diarrhea, pain in the stomach, *et cetera*, this gives good results.

COLIC

Symptoms: A sharp, shrill cry, coming on in paroxysms, and the legs drawn up. The child cries pitifully. The stomach and the bowels may be distended with gas.

Treatment: Warm the feet and the hands before the fire, or wrap them in heated flannels, or apply heat by means of the hot water bag. Care should be exercised with the water bag, that it is not too hot; for it may burn the child. Sand, salt, bran, or even corn meal can be put in a bag and heated to apply to the stomach and the abdomen. The old-fashioned remedies of catnip tea, peppermint, and anise water may be used with no bad effects, but the only relief usually given by these is the raising of a small amount of gas from the stomach. Hot water will nearly always do as well. Care of the mother and her diet is a greater safeguard against colic, if she is nursing her infant.

CONSTIPATION

Symptoms: Hard stools, straining, pain, discomfort.

Causes: Bottle-fed babies are predisposed to constipation. Usually it is due to want of fat in the diet. It may become a habit, through lack of care at regular intervals daily. Some children are constipated when nursing from the breast. Under such conditions, something is lacking in the mother's milk.

Treatment: Establish regularity early. Every morning, during the bath, hold the child "out," teaching it to strain at stool. Very early it will understand your object. This procedure can be followed twice daily. If this does not prove successful, a small piece of glycerin suppository may be placed in the rectum; or gluten, cocoa butter, or soap suppositories may be used. A half

teaspoonful of milk of magnesia may be put in the bottle with water twice daily, and given the child to nurse.

Make flaxseed jelly by adding one and a half cups boiling water to half a cup of flaxseed, and letting them stand till cold. The jellylike substance thus formed, can be fed to the infant freely with a spoon. Later, when the child has reached the age of five or six months, orange juice or prune juice may be given. It is not a good plan to begin drugging a child in its early life, or in fact at any time. The intestines become irritated and habitual constipation develops. Regulate its diet and general *régime* if possible.

TEETHING

This is a time of great anxiety for most mothers, not because it is such a difficult time with most children, but because so many old women have told so many sad stories of the hardships found in teething. The little teeth know their own course. Nature adapts everything for them. In most cases, they cut through the gums easily; and many mothers have been surprised to find one or two teeth in the mouth when the child has been no different at all. There are instances, however, when the teeth are cut late. This usually is more difficult, because the child is older and the gums harder. When the gums are swollen and red, a piece of ice rubbed on them, or the finger dipped in cold water and applied to them, is very soothing. Another treatment that relieves the congested gums is given by dipping a piece of absorbent cotton in warm water and applying it, then alternating with a similar piece of cotton dipped in ice water. It is not well to lance the gums unless this is advised by the physician. Rubbing with thimbles, buttons, *et cetera*, is pernicious, for those articles ordinarily are not cleansed first, and may add infection to the inflamed parts.

Sore month and inflamed gums may interfere with the digestive process, because sucking hurts them. The appetite may be lessened, saliva increased, and general discomfort may be noticed.

Whether "teething" is responsible for all the disorders that are attributed to it, is a question. Almost always something else is producing the symptoms; and prompt treatment will quickly remove the inflammation for which the teeth have been blamed. (See chapter 27.)

HICCOUGH

This is not a serious malady, although it may be very annoying. It consists of a spasmodic contraction of the diaphragm, usually a result of gas in the stomach or an overloaded stomach. It may be due to other causes, but is dependent upon some digestive disturbance. Changing the position rapidly may relieve

it, as may also raising the arms quickly, patting on the back, giving hot water or perhaps a little dissolved soda mint. Older children find relief in drinking a glass of water, or holding the breath as long as possible.

CONVULSIONS

One of the most common and dangerous conditions of infancy is convulsions. It demands presence of mind and decision on the part of the mother, also a knowledge of what to do. The causes are varied. Convulsions may mark the beginning of some severe illness, such as pneumonia, scarlet fever, or inflammation of the brain; or they may come from indigestion, constipation, intestinal worms, fright, hot weather, *et cetera*. They are much more frequent before the first year of age.

In a typical case of convulsions, the child makes a choking sound, stops breathing for a moment, becomes unconscious, and stiffens out or arches backward. The eyes roll, stare, or turn cross-eyed. The mouth shuts tightly. In a few moments, the face becomes bluish colored, and the twitching begins. Breathing at this stage is noisy and irregular. The arms, the legs, and the trunk muscles jerk in every direction, and the eyes roll upward. Frothing at the mouth is present; and if the child has teeth, they are ground together, the tongue sometimes being bitten. The movements gradually lessen. The child cries, and then passes into a heavy sleep, with the body stiffer than usual. This rigidity may not leave the body before another spasm comes on. When the child has many convulsions, its life is in much danger.

Treatment: This must be prompt. The warm bath and the warm enema are very necessary. The bath should begin at 100° F., and the heat increased to 102° F. as soon as possible. The bath should be large enough to cover the child well, cold being kept to the head continuously, and renewed frequently. The child must be left in the water ten or fifteen minutes, or until it relaxes, then wrapped in a warm blanket.

The enema may be given as soon as the bath is over, if suitable apparatus is at hand, and the room is warm enough to avoid exposure. This can be done as described in the first part of this chapter, the catheter being used to force water as high in the bowel as possible, and enough water being injected to insure thorough cleansing. An emetic may be needed. A glass of warm water with half a teaspoonful of salt, or half a teaspoonful of alum in sirup or molasses, may be used. Sirup of ipecacuanha, one teaspoonful every fifteen minutes, is a very sure emetic.

Epilepsy is similar in appearance to convulsions, and may occur in early childhood. It is distinguished from ordinary

convulsions by its recurrence at regular intervals as the child grows older. No special treatment is needed during an epileptic attack, other than to place the patient in a comfortable position and loosen the clothing about the neck. No efforts should be made to straighten the limbs.

When convulsions occur, a physician should be called to determine the cause of the trouble and to institute treatment.

DIARRHEA

There are several forms of diarrhea, known as summer diarrhea, cholera infantum, and dysentery.

Summer diarrhea is so called because it occurs in the hot summer weather. Often it is caused by improper food. It is exceedingly common in bottle babies, being produced probably by the changes in the milk from the growth of germs. The passages are frequent, and the fluid is of a greenish yellow color. There may be some fever the first day, but generally it is not high.

Cholera infantum exhibits very numerous passages of watery, colorless substance, attended with constant vomiting, high fever, and great prostration.

Dysentery, on the other hand, has small stools, very frequent, greenish yellow or brown, with streaks of blood, and containing much mucus. Sometimes considerable bloody mucus is passed. Vomiting is not a prominent symptom, and the fever is not usually high. There is present a marked degree of straining.

Treatment: The infant grows thin rapidly in a severe diarrheal attack, becoming wasted, shriveled, and cold in a few hours. The mother should begin some simple treatment very early in the attack. The first and most important early treatment is the withholding of all food. Give a dose of castor oil, followed in two hours with a warm saline high enema (passing the catheter high in the bowel), to reduce the straining. Follow the high enema with flaxseed and ginger poultices to the abdomen, alternating the warm poultice every eight or ten minutes for three quarters of an hour. When the poultices are removed, dry the abdomen carefully, and cover with dry, warm flannel pinned snugly around the body.

If the child seems hungry, give warm barley water, with no milk. Bismuth and chalk mixture, or milk of bismuth, one teaspoon every two hours, is excellent as a medicine. Paregoric, laudanum, and other opium preparations should not be given by the mother. They may be efficacious, but they are dangerous.

Insufficient clothing is often the cause of diarrhea. Infants and small children should have abdomen, arms, and legs covered

warmly when the weather is changeable. This is a valuable preventive of diarrhea.

COLDS

Colds in the head are common disorders in baby life, often due to being in drafts, or to being too warmly clad. Drafts must be avoided, especially on the child's bare head; and it must be kept warm, but not overheated. The disease is troublesome in infancy, for the obstruction to breathing renders sucking difficult.

Treatment consists in giving a warm bath, drying carefully, and keeping the baby well covered and protected in a well venti-



Heating chest pack for bronchial and lung diseases in children. Left: The wet compress. Right: The dry covering.

lated room. A laxative should be given, either castor oil or milk of magnesia. Food should be reduced in quantity and quality. (See chapter 12.)

The nose should be treated with vaseline applied within by a camel's-hair brush, or absorbent cotton twisted tight and small enough to pass into the nostrils. Camphorated oil on the outside of the nose and forehead, also across the chest, is effective. Colds should be treated thoroughly and early to prevent deeper-seated trouble.

CROUP

In this connection, read what is said on diphtheria, in chapter 44.

This disease is very alarming, although not often dangerous. It is generally caused by exposure to cold, but is frequently due

to indigestion. The symptoms usually are not noticed during the day. The child plays about until bedtime, often going to bed in apparent health, and toward midnight awakens the whole household with its peculiar croupy cough. It sits upright, grasps anything it can reach, and struggles for breath. The cough is loud and very characteristic. The breathing is very noisy, the voice hoarse. The face is bluish and perspiring. The condition lasts only a short time.

Treatment: This is preventive. Children should be guarded against exposure to wind and dampness. When the attack comes on, the warm mustard bath is excellent; but as a rule, this is not obtainable at midnight, and the quickest application to relieve the attack is a cold compress. (See chapter 10.) This is made by wetting a small, thin towel in cold water (ice-cold if possible), and applying to the chest. Cover it with a larger dry towel, and apply two other towels by folding them double lengthwise, passing one over the shoulder, the chest, and the back, and under the opposite arm. Apply the other towel in the same way, only over the opposite shoulder and under the opposite arm. Pin with safety pins at the neck, under the arms, and wherever loose, so that the compress is held securely, with no moist part of the wet towel uncovered. This soon warms from the heat of the child's body, and acts as a slow fomentation.

BRONCHITIS

Bronchitis is an inflammation of the bronchial tubes, accompanied by a cough. It is common in children. The cause is exposure to wet and dampness. The cough is dry and tight at first, but later becomes loose and rattling. The child does not seem very sick, although there is slight fever. It coughs up mucus; but with children under six or seven years of age, this is swallowed instead of being spit out.

Treatment: The treatment that should be given is that advised for cold in the head, combined with thorough rubbing of the chest front and back twice daily with olive oil and eucalyptus oil (one ounce olive oil to one dram eucalyptus oil), the parts rubbed being covered with warm pieces of flannelette large enough to cover the whole chest and back. Oil of amber and olive oil, equal parts, can be used instead with infants less than one year old. Bronchitis must not be neglected, as it is liable to pass into pneumonia.

PNEUMONIA

Bronchial pneumonia is the type oftenest seen in children under two years, and it is usually the result of an attack of bronchitis. The attack sometimes comes on suddenly, with a

convulsion. There are high fever, flushed cheeks, frequent, painful, and very short breathing, and coughing. The breath is catchy, with a peeuliar grunt. The child is restless and tossing, or it may be very sick and lie quiet, with cheeks pale and lips blue, breathing being very rapid and shallow.

The disease is very serious, and requires attention at once from a physieian, with skilled nursing. The mother may greatly assist by keeping the feet warm, and having fresh air in the room, without drafts on the child. If the blueness is noticed, place the ehild in a warm bath; or if unable to move it, place the feet in warm water. This may save its life till the physieian comes.

CHAFING

This may occur where two moist surfaces of the skin touch each other. It is eommon in the folds of the neck of fat babies, in the armpits and the groins, and on the buttoeks and the thighs. In many eases, it is eaused by the diapers, particularly when they are not ehangd often, and in diarrheal troubles. The skin is red, moist, and almost raw. The disease may be prevented by frequent washing with warm water, too much soap being avoided. When it occurs, eover the surfaee with "eold cream," or dust with stearate of zine powder. If pieees of absorbent eotton are eovered with the ointment or the powder, and laid in the folds affeeted, it will be more eomfortable than allowing the raw surfaees to come together.

BED-WETTING — INCONTINENCE OF URINE

The habit of wetting the bed by night and the clothes by day is a disease, and not a habit merely, and the ehild should not be punished for it. The eauses are many, and the advice of a physieian is neecessary. The treatment for the mother to give is to see that the ehild has a light supper, and that this is given one hour or more before bedtime. See that it passes its urine just before going to bed, drinks no fluid for some hours before bedtime, is taken up frequently during the night to empty the bladder, that it sleeps on its side and not on its baek, and is not too warmly eovered. To prevent sleeping on the baek, tie a folded pieee of paper, an empty spool, or a pasteboard box at the middle of the baek.

Children wet themselves more in eold weather. Give warm baths to the skin, using some massage cream or oil on the skin to soften it. Dress the ehild warmly, and ehangd it frequently if its clothes are wet.

Section XVII—Transmissible Diseases

CHAPTER 67

Sources and Modes of Infection

An infectious disease is one caused by specific microörganisms, or germs, which are capable of multiplication in the body, where they produce the poisons that cause the symptoms of the disease.

An *infectious* disease that may be communicated directly from one person to another is termed *contagious*. Whether or not an infectious disease is contagious, and the degree of contagion, depends upon the nature of the infecting agent, its manner of elimination from the body, and its avenue of entrance into the body. For example, diphtheria and smallpox are considered highly contagious, while typhoid fever, although it is contagious, is much less so than the two former. Practically all contagious diseases are infectious. A few, such as scabies, and other parasitic diseases of the skin, are contagious but not infectious.

We are continually coming in contact with disease germs. They may enter the body through the air we breathe, the food we eat, the water we drink, through wounds or abrasions of the skin, and through the mucous membrane; but like other forms of life, germs must have suitable soil for growth. This they often find in our bodies. Yet, under normal conditions, unless the infective agent is very virulent, one is able, by means of the body defenses, to combat successfully the invading bacteria. (See chapter 2.)

Pneumococcus germs, which cause pneumonia, are often present in the mouth and respiratory passages of an apparently healthy person, without causing the disease. The same is true of other kinds of germs. But if the body resistance is lowered by wrong habits of eating, loss of sleep, impure air, improper breathing, or excesses of any kind, including worry and fear, all of which mean disregard of the physical laws governing our body, we lessen the ability of our body to fight disease germs, and are likely to contract an infectious disease. Most of us are so far from the normal state of health, because of our faulty habits, that we are subject to infectious diseases of all kinds.

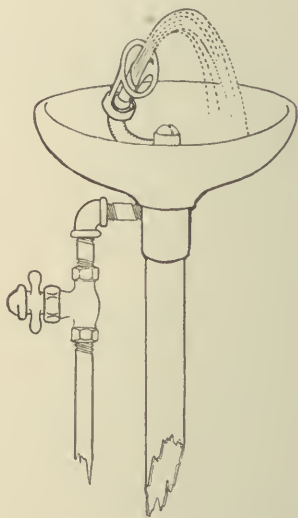
While it is a well-known fact that fear of an infectious disease may render one more liable to the disease, yet one should not be presumptuous, and needlessly expose one's self to the disease, even though in normal health. The practice of some parents, of exposing their children to measles or other acute infectious diseases, in order that they may have the disease while young, with the excuse that they are bound to have it sometime anyway, is almost criminal; for many people pass through life without having the diseases of childhood.

COMMON SOURCES OF INFECTION

Dust. Impure or dust-laden air is a common carrier of disease germs, and particularly of diseases of the respiratory tract, such as colds, bronchitis, pneumonia, and tuberculosis. Crowded rooms in which the air is contaminated through lack of ventilation, or by one suffering of a cough, a cold, or some other infection of this class, or by the dust raised by the constant moving of the feet, are very common sources of infectious diseases. Sweeping, as ordinarily done in the average home, with its accompanying cloud of dust, very often becomes a factor in spreading disease germs. Not only does the dust contain germs of disease, but it acts as an irritant to the mucous membrane of the organs of respiration, and thus lessens the resistance to infection. People living in the cities are especially subject to infection from street dust. Miners and workers in granite very often develop tuberculosis, as the inhalation of the hard dust irritates the delicate membranes of the respiratory tract, thus furnishing a good field for the growth of disease germs. Cerebrospinal meningitis and infantile paralysis are caused by germs that probably enter the body through the nose and the throat.

The filthy habit of expectorating on the floor or the walk is doubtless responsible for the spread of a large number of diseases; yet some seemingly intelligent people persist in this pernicious habit, in spite of laws forbidding it.

Water. Impure water and ice are another common source of infectious diseases. Typhoid fever, and many cases of in-



A Sanitary Drinking Fountain

testinal diseases, such as diarrhea, especially among children, are caused by water or ice that has become contaminated with germs, which find in the bowel tract a fertile soil for growth.

The public drinking cup, which, thanks to our modern laws, is largely a thing of the past, but even yet is seen in some localities, is a frequent source of disease. Germs of tuberculosis, diphtheria, and common colds, as well as many others, are often spread in this way. Even many of the public drinking fountains are far from sanitary; and one has only to observe the manner of some in drinking at these fountains, to be convinced that they may be contaminated with disease germs. Laboratory tests have shown that disease-producing germs may be obtained from the average drinking fountain. It is far safer, when traveling, to carry your private drinking cup.

Food. Foods may be either directly or indirectly the cause of infectious diseases,—indirectly through lack of some of the elements to keep the body in a healthy condition, thereby lessening its ability to resist disease germs, and directly by containing toxins or toxin-producing bacteria that may cause disease.

Milk, being a good culture medium, or food, for germs, as well as good food for man, is perhaps one of the commonest foods that may become a carrier of disease germs. These same germs may also be carried in butter. Milk from cows with diseased udders frequently causes sore throat, tonsillitis, or bowel troubles. Serious epidemics of tonsillitis, scarlet fever, and typhoid fever have been traced directly to the milk supply of the community. Tubercular germs also may be carried by milk or butter. (See chapter 46.)

Not only may the milk be contaminated by coming from diseased animals, but the milker, or the one who washes the pails or the cans or the bottles, may be recovering from an acute infectious disease, or may be what is known to-day as a carrier. (The term "carrier" will be explained under the heading "Man as a Carrier of Disease.")

Again, these utensils may have been washed in contaminated water; or bottles used on the milk route may enter a home where some member of the family is ill, and not be thoroughly sterilized before being filled again and taken to some other home. Thus by the time the milk reaches the consumer, it may contain millions of disease-producing germs. Notwithstanding laws on hygiene and sanitation, some one may be careless, and infection may be spread as a result.

Children perhaps suffer oftenest of diseases carried in milk, this being a very necessary part of their diet, and children being notably susceptible to acute diseases.

Great care should be taken to see that the milk supply is above question. Our laws have done much to assure us clean milk; but even with all these, it is a good practice, unless one is sure of the source of the milk supply, and even then it is well, to Pasteurize milk before using.

Decayed or unripe fruit should not be used. Fruit that has been exposed to the dust of the street should not be eaten without being peeled or thoroughly washed. Celery, carrots, radishes, lettuce, and other vegetables that are eaten raw, should be carefully washed before being eaten, and should not be grown in soil that has been fertilized with human excreta.

Decayed fruit may become a carrier of germs that cause disturbances of the bowel which are common to children. Vegetables grown in soil contaminated with fertilizer may become carriers of typhoid fever and parasitic infections of the bowel. Raw oysters and other shellfish have frequently been the cause of typhoid fever epidemics.

Eating more than is necessary, especially of protein food, allows the accumulation of toxins in the system, which lowers the power of the blood to cope with infection.

MAN AS A CARRIER OF DISEASE

Man himself is a frequent carrier of the germs of infectious disease. By coming in contact with one who is ill, he may get the germs on his clothing, hands, and hair.

It is not unusual to find a person who is carrying the germs of an infectious disease in the mucous membrane of mouth, nose, and throat. While he himself may not be suffering of the disease, yet he may be a source of infection, and spread the disease. Such a person is known as a "carrier." He may be carrying some of the most virulent disease germs, such as those causing diphtheria. In fact, a large number of diphtheria carriers are contaminating public drinking cups and fountains, and in numerous ways infecting other people.

There are also typhoid fever carriers, people who may themselves apparently have recovered from the disease, but still have the typhoid fever germs present in some part of the body, such as the gall bladder, the bowel tract, the kidneys, or the bladder, from which parts they are being eliminated, and may continue to contaminate the food and water supply of the community. A number of epidemics of typhoid fever have been traced directly to such carriers who have had a part in the preparation of the food or in some other duty, and thus have spread the infection.

Infectious diseases may also be carried by clothing, dishes, bedding, books, toys, and other articles brought in contact with

the sick. Certain contagious skin diseases, such as impetigo (see chapter 50), may be transmitted by pencils, books, and more especially by towels.

We must not fail to recognize the fact that constipation, or improper elimination of body wastes, by allowing the accumulation of poisons in the system, lowers the resistance of the body and is a common predisposing cause of infectious diseases.

INSECTS AND DISEASE

Actual knowledge on this subject has been acquired only within recent years. It marks as brilliant an epoch in the history of medicine as the period of development of bacteriology, which just preceded and overlapped it. Some of the diseases are tropical; but many, as bubonic plague and malaria, occur in all parts of the world.

The first man to establish the fact of the transmission of a disease of man by an insect was Patrick Manson, of England, who in 1880 demonstrated that the mosquito is instrumental in carrying a little worm of the blood, *filaria sanguinis hominis*, which causes elephantiasis, the patients having great enlargements of limbs and other parts of the body. Four years later, in 1884, Koch and Laveran, independently, showed that malaria is carried by mosquitoes; in 1900, Dr. Walter Reed and his associates proved that yellow fever is transmitted solely by a certain species of mosquito; and to date, there are a large number of serious infectious diseases of man that are known to be carried by insects only, and many more of which insects are occasional carriers, to say nothing of the great annoyance of flies, mosquitoes, bedbugs, lice, ticks, itch mites, fleas, cockroaches, ants, *et cetera*.

Thus a knowledge of a few of the facts concerning the relation of insects and allied species to diseases of mankind, and how to prevent them, is important to all, and especially to a people whose interests lead them into all parts of the world. And in order for a person to be intelligent and effective in his efforts, he must know something of the habits of the insects, and also of the virus that is carried, which is the real, immediate cause of the disease.

In the majority of instances, the specific organism of the disease is a protozoan (the smallest type of animal life, and not visible to the naked eye), which undergoes an essential life change in the body of the insect. This life change, or cycle, requires a definite length of time; and thus after the virus of the disease has been taken up by the insect, a period of a week or more must elapse before the insect is capable of carrying the

disease to some one else. For example, in yellow fever, this period is twelve to fourteen days.

Again, the infectious material that causes the disease may be transmitted in a very mechanical way, as with the common house fly, which contaminates its feet and proboscis upon the stools of a typhoid fever case, then settles on food about to be eaten by some person who is susceptible to typhoid fever. Here the typhoid bacteria are simply "cart-carried" on the feet of the fly, or are regurgitated or defecated, the bacteria not undergoing any necessary life cycle in the fly.

MOSQUITOES AND MALARIA

In 1895-1900, Sir Ronald Ross and Sir Patrick Manson worked out quite conclusively the relation between malaria and a certain species of mosquito, the *Anopheles*. All evidence indicates that the *Anopheles* mosquito is the sole carrier of malaria. The malarial organism has been found only in the blood of those suffering of malaria or in the bodies of infected mosquitoes.

Only a trained entomologist is able to tell definitely what species a particular insect belongs to, and he must have access to quite elaborate keys; but anyone with a little knowledge may recognize the *Anopheline* mosquito. The following points will help to differentiate it from the common mosquito, *Culex*:

1. An adult *Anopheles*, when resting, stands as it were on its head, and the line of the back is straight. The *Culex* rests parallel with the surface, and the back is humped. The *Anopheline* has spots or dapples on the wings.

2. In the larval or wiggler stage, it is very readily detected. The *Anopheline* larvæ lie flat at the surface of the water, and do



Culex: The common mosquito



Stegomyia: The mosquito of yellow fever



Anopheles: The mosquito of malaria

From Yellow Fever Institute Bulletin No. 13



From Yellow Fever Institute Bulletin No. 13

Eggs of *Stegomyia* Mosquito, Upper and Side View

Mature Larva of *Stegomyia* Mosquito

Pupa of *Stegomyia* Mosquito

not have a siphon, or breathing tube. The common mosquito hangs down at an angle, with a short siphon, or breathing tube, coming up to the surface of the water. The wigglers may be found in almost any quiet, shaded pool of any size. Most rain barrels contain them.

3. The eggs of the common mosquito are seen on the surface of the water as little black, boatlike rafts about one fifth of an inch in diameter, containing about 250 elongated eggs. These look like particles of soot floating on the water. The eggs of the malaria mosquito are laid singly or in little ribbonlike bands, are brownish in color, and when viewed singly, the middle presents a rufflelike band.

The malarial parasite is a minute organism that lives in the red blood cells of persons who have malaria. (See color plate, page 20.) In transmitting the disease, the Anopheline female (for only the females bite man) sucks blood from the patient, the parasites entering the intestinal tract of the mosquito, and here they undergo an important life change; and in the course of eight to ten days, the young parasites, known as sporozoites, are all through the body of the insect and in the saliva. Then, if the infected mosquito bites one, the bite being a combination of sucking and regurgitation, the young parasites are readily introduced into the blood stream of man. And in man, the parasites reproduce and are capable of living for years. Man also is then a reservoir of malaria, and it is chiefly in this way that malarial infection is kept over from one season to another in malarial districts. Thus, in a given region, to have malaria, there must be human cases and Anopheline mosquitoes.

Habits of the Mosquito. The eggs are deposited on the surface of a quiet body of water, any size being adequate, such as a rain barrel, tin cans in the back yard, or little puddles around leaking faucets. A very small amount of water is sufficient if a luxuriant shade of grass or weeds is present. These insects do not breed well in places exposed to direct sunshine. The female must have a meal of blood before being able to deposit her eggs, and therefore it is usually the females that are found about human habitations. The males live on fruit largely. The eggs hatch in two to three days; and the little larvæ swim about in the water, with their characteristic jerky, whiplike motion, and hence are called wigglers. When disturbed, they dart out of sight to the bottom of the water to hide under some object; but they must come to the surface to breathe. The wiggler stage lasts ten to twelve days. Then the larva goes into the pupa or resting stage. The pupal stage lasts two to three days, when the adult cuts an opening in the top of the incasement, dries its wings, and flies away. Adult mosquitoes may live over until the next season; and the egg may dry, and hatch many months later. The range of flight of the mosquito is not great; but they may go a mile or more, especially with a strong wind. The malaria mosquito bites in late afternoon and night.

Combating Malaria. For the spread of malaria, there must be *Anopheles* mosquitoes, and human beings harboring the parasites. But if the mosquitoes are not numerous, and the human cases are few and protected from mosquitoes, and particularly if quinine is used in treatment of all cases, malaria cannot become extensive. This is an important principle to remember in combating diseases carried by insects and other pests—that it is not necessary to exterminate the species (which is obviously impossible) in order to lessen the disease greatly, or even stamp it out completely, in the section.



Inspecting Water for Larvæ of Mosquitoes

The general attack on malaria may be outlined somewhat as follows:

1. Measures directed against the breeding of mosquitoes:

a. Whenever practicable, remove still bodies of water, by filling in or by draining.

b. Remove obstructing vegetation from small streams, and when possible, clear away vegetation for a short distance back from the water's edge.

c. It is best not to have a mass of vines, grass, and vegetation immediately surrounding a dwelling, as it affords hiding and breeding places for adult mosquitoes.

d. The surface of standing water may be oiled. This kills the larvæ by asphyxiating them as they come to the surface to get air. For this purpose, a hand spray may be used. A mixture of soft soap and crude petroleum, one half pint to one hundred square feet of water surface, is satisfactory. It should be repeated about every two weeks.

2. Measures directed against the adult mosquitoes:

a. A daily hunt should be made for mosquitoes, even in a well screened dwelling, and they should be swatted. Mosquitoes like to rest on a dark surface in the day, hence a place on the wall may be darkened to lure them.

b. When inside a dwelling, they may be killed by fumigation, either with burning sulphur, two pounds to the one thousand cubic feet of room space, or with pyrethrum powder, set on fire with a little alcohol, two pounds to the one thousand cubic feet. This latter only stupefies the mosquitoes, and they must be swept up and burned.

3. Protection of individuals from being bitten by mosquitoes:

a. The house should be thoroughly screened, preferably with copper wire screen, which should have eighteen meshes to the square inch. Screen doors should open outward.

b. One should not expose one's self after sunset, as malarial mosquitoes bite at night. Headgear nets and protection for the hands should be worn if one must be out of doors.

c. There should always be mosquito bar over the bed, even if the house is well screened.

d. The house should be well removed from native huts in the tropics.

e. The house should be on as good an elevation as possible.

f. Mosquitoes prefer the lower floors of a house, so the upper stories are preferable.

4. Quinine as a preventive:

All persons having malaria should be well screened from mosquitoes, and should use quinine until cured. Also those who are

in a community where malaria is prevalent, and who know that they will be exposed, should take quinine regularly. In sections in the world where drainage and other permanent procedures cannot be carried out, the use of quinine is the one means of attacking malaria on a large scale. Some of the best authorities on malaria look upon this as the most practical method of attack in many places.

Treatment: The following is the standard quinine treatment recommended by the National Malaria Committee and approved by the United States Public Health Service:

"For the acute attack, ten grains of quinine sulphate by mouth, three times a day, for a period of at least three or four days, to be followed by ten grains every night before retiring, for a period of eight weeks. For infected persons, not having acute symptoms at the time, only the eight weeks' treatment is required."

"The proportionate doses for children are: under one year, one half grain; one year, one grain; two years, two grains; three and four years, three grains; five and six and seven years, four grains; eight, nine, and ten years, six grains; eleven, twelve, thirteen, and fourteen years, eight grains; fifteen years or older, ten grains."

This standard quinine treatment for malaria should be taken only upon the advice of a physician and under his direction.

Quinine is the only treatment for malaria.

MOSQUITOES AND YELLOW FEVER

In 1882, Dr. Charles Finlay, of Havana, presented a report, based on experimental work, to the Royal Academy of Medical, Physical, and Natural Sciences, in which he attributed to the mosquito the transmission of yellow fever. After the occupation of Cuba, 1898, by the United States, very strenuous efforts were made to exterminate yellow fever in Havana. The city at that time was under military control, and was in a good sanitary condition; but the disease continued to exist. In 1900, there were 1,244 cases and 310 deaths. That year, the American commission, consisting of Walter Reed, James Carroll, Aristides Agramonte, and Jesse W. Lazear, was sent to Havana. In a very short time, they had disproved the idea that yellow fever was transmitted by soiled clothing, vomitus, and excreta of the patient, and proved conclusively that the *Stegomyia* mosquito is the cause.

The *Stegomyia* mosquito is almost black, and has a silvery lyre or Jew's-harp marking on the thorax. The legs and the abdomen

have silvery bands. This mosquito, after once entering a house, rarely leaves it; and this fact explains the danger of occupying a room that has been occupied previously by a yellow fever patient. The *Stegomyia* is a house and town mosquito, breeding in old tin cans, roof gutters, and cisterns. The malaria mosquito is more rural in its habits. Ships employed in carrying sugar and fruit are breeders and carriers of the *Stegomyia*. It rather prefers dark, covered receptacles. The adult mosquito is feeble, and never flies far.



Colonel Gorgas, the Conqueror of Yellow Fever in Havana and in the Canal Zone

Preventive Measures.

The general attack is somewhat like that in malaria, but there is no specific drug that will prevent and cure the disease, like quinine in malaria. Yellow fever is a very acute disease, largely confined to the tropics and the subtropics. The patient is infectious during the first three days of the disease only, and the *Stegomyia* is a very domestic insect.

1. Maritime quarantine is very successful in preventing the spread of the disease to other parts of the world, practically all the endemic localities being in communication with the rest of the world by means of vessels.

2. The thorough isolation and screening of the patients is of paramount importance; and the house should always be fumigated after the case.

3. All dwellings should be screened.

4. If possible, one living in an infected district should leave the place early in the evening and retire to a good elevation. *Stegomyia* are never seen at an elevation of 3,000 feet.

5. Adult mosquitoes should be killed by swats, traps, and fumigation with sulphur, or stupefied with burning pyrethrum and then swept up.

6. The most effectual means of preventing yellow fever is to lessen the breeding of mosquitoes, by draining and filling in, use of petroleum, and especial watchfulness of the little places immediately around dwellings. Therefore a thoroughly trained

organization, with mosquito brigades, a supervisor, *et cetera*, to see that screens are in good condition, back yards kept free from tin cans, cisterns and rain barrels covered, and so forth, is necessary.

Filariasis and dengue also are transmitted by the mosquito. (See chapter 72.)

We thus have four quite important diseases of man carried by mosquitoes: malaria, yellow fever, filariasis, or elephantiasis, and dengue. Besides this, mosquitoes are an unmitigated nuisance, and any community is justified in spending substantial sums in combating them. And it must not be understood that this is the business of the community only; for many times, attention to conditions right around the home will give good results.

FLEAS AND PLAGUE

Plague is a disease primarily of rats and secondarily of man. In 1898, the German Plague Commission established the fact that there were plague bacteria in the bodies of fleas taken from rats dead of bubonic plague. The organisms of plague are taken up by the rat fleas from the blood of rats suffering of plague. As the sick rats die and many of the well rats migrate, the fleas of necessity feed upon man. The flea defecates frequently, and also regurgitates as it feeds. A plague-infested flea regurgitates a great deal; for the bacteria multiply in the stomach and the gizzard, and cause irritation and blocking. Thus the plague bacilli are very readily introduced into the wound made by the fleabite.

Measures Against Fleas. Flea eggs are not attached to hairs, so they are found here and there on the floor, in corners and crevices, and are very abundant in the bed of animals infected with fleas. Kerosene is the best known agent in the destruction of fleas.

Measures Against Rats. The attack against plague must be handled by the destruction of rats and other rodents, particularly ground squirrels. When an epidemic is threatening, a proper plan would be the organization of the entire community, with a central and controlling head to direct the activities, and rat-catching squads to engage in catching, poisoning, and rat-proofing, especially protecting places where food material is stored. Rats should be tagged as to where caught, and sent to the laboratory, and thus the directors can be informed as to the plague-infected areas. It would seem impossible to destroy the entire rat population, but this is not necessary. If fifty to eighty per cent of the rats are destroyed, and their breeding is kept down, plague cannot spread. The plan should be to destroy as

many rats as possible, to rat-proof buildings, wharves, *et cetera*, and to remove food from them. Concrete and corrugated iron are the best rat-proofing materials. All buildings not properly rat-proofed should at least be elevated sufficiently to allow free access of cats and dogs underneath the floor. Garbage cans should have well fitting lids, should be on an elevated platform, two feet from the ground, and should be frequently emptied.



Food exposed to street dust should be avoided.

Flour, grain, and other foodstuffs should be either in rat-proof buildings or in iron cans. The starved rat doesn't thrive.

FLIES

Until recently, the fly was quite misunderstood, and its life cycle and habits were not thoroughly traced. It was regarded as a great friend to mankind, and especially as a valuable scavenger. It is neither. In the words of one deluded enthusiast, the fly was "a dipterous angel dancing light attendance upon Hygeia." In reality, it is rather (in the words of Lord Avebury) "a winged sponge, flying hither and thither to fulfill the foul behests of contagion."

Habits and Development of the Fly. A female fly lays 250 to 1,000 eggs, and a generation may be produced every ten days, and thus twelve or more generations in a summer. In forty days, if only half of these survived, a fly could produce 810 pounds of flies. The importance of beginning measures of suppression early in the spring is therefore plain. The eggs are

preferably laid in horse manure, but they may be deposited upon cow manure, human excreta, or, in fact, any decaying organic matter. This is because the newly hatched larvæ require predigested food, having no digestive glands.

The egg hatches in one half to two days. It lives in the larval or maggot stage four to eight days, in the pupal or chrysalis stage three to five days, the total period of development being from seven to fifteen days. The egg requires moisture and warmth to hatch. The larva, or maggot, grows rapidly, and in three to five days, burrows out into the dry earth, where it becomes quiet and develops a tough, brownish incasement, thus entering the pupal stage. At the end of four or five days, the covering is broken open and the adult fly emerges. Not having had any food for four or five days, it will feed voraciously upon soluble carbohydrate or predigested protein. The former it gets from kitchen refuse, and the latter from feces. It is seen to go back and forth from the available food in our homes to garbage and perhaps to excreta in the open toilet. Thus "dirt, diarrhea, and dinner become sadly confused." When resting, it frequently regurgitates its fresh meal, and may leave a little of it on your cake. Also, a well fed fly defecates every few minutes.



The common fly should be looked upon as an enemy to health.

The Capacity of the Fly for Carrying Germs. Flies transmit infectious material in two ways: first, by biting, and inoculating the wound with the virus, as in the case of the tsetse fly transmitting sleeping sickness; and second, by mechanically carrying material and depositing it upon food or drink, or directly upon the body of the victim. The common house fly does not bite, but is a mechanical carrier.

The following anatomical points about the house fly are of interest:

1. It can take food only by sucking. Solid food is moistened by saliva from its ample salivary glands before it can be ingested.

2. The salivary glands are the only digestive glands of the alimentary tract, therefore soluble and predigested foods are sought.

3. It has a large crop, besides the stomach. After a full meal, it is often seen to regurgitate and reswallow.

4. The body is covered with hairs and bristles. The feet are of especial interest, being supplied with minute hairs, bristles, terminal claws, and adhesive pads, which enable it to stick to surfaces. In the words of Major Lelan, R. A. M. C., "For the conveyance of organisms in vast numbers, it would be difficult to imagine a more suitable apparatus than the fly's foot."

As flies alternate between human excreta and human food, and as a grain of feces may contain twenty million or more infective organisms, we see how this unmasked traitor, as a "winged sponge," is capable of transmitting disease. The crop of the fly may contain many million bacteria; and as before stated, the crop contents are often regurgitated upon food shortly after being ingested. Of eighteen flies examined, that were allowed to pass freely between swill tub and earth closet, an average of 4,600,000 bacteria were found on the feet and the legs. These points, combined with the fact that the most delicate organism of the intestinal diseases, the cholera organism, is capable of surviving eighteen hours' exposure on the fly's foot, would lead us to believe that the fly is at least a potential source of danger.

The principal diseases of which the house fly may be a transmitter are typhoid fever, cholera, dysentery, tuberculosis, and diseases of the skin and eyes.

Methods of Suppression of Flies. The general attack may be outlined as follows:

1. Prevention of fly breeding.
2. Measures to kill adults.
3. Protection of food from flies.

1. *Prevention of Breeding.* This is brought about by strict cleanliness of the environment, prompt and efficient removal of all decomposing organic material.

a. Stable manure is the most important item. The best method is to place the manure in a well covered, screened receptacle, and remove it once a week. This is by far the most essential single measure. In cities, it is a simple matter. The addition of chemicals is expensive, and lessens the fertilizing value of the manure. One neglected stable will furnish flies for a whole precinct.

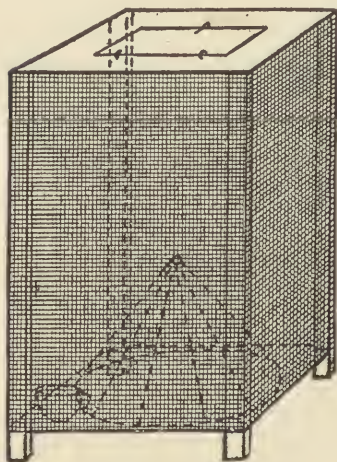
b. The prompt and cleanly disposition of garbage is next in importance. The receptacle should be water-tight and fly-tight, and well up on a platform, and have a tight fitting lid, kept in place on the can and not off on the ground. The ground around should be kept strictly clean.

c. Human excreta should be absolutely out of reach of flies. The old-fashioned open earth closet, giving free access to flies, rats, chickens, *et cetera*, should not be tolerated anywhere on earth. (See chapter 9.)

2. *Destruction of Flies.* This means devoted diligence.

a. The "swatter" should be on hand in every home, and should be used at once when a fly is seen.

b. Traps are valuable means of lessening the number of adult flies about. A good trap that can be made by anyone is the



An Effective Flytrap

screened box trap. The flies are attracted through the dark hole at the bottom by the smell of the bait, which is placed in the bottom of the trap. They enter through the small hole, and are unable to return. For bait, use a piece of decaying fish, or molasses (one part to water three parts), or simply sour milk. Always remember the bait.

c. Sticky fly paper also will catch a few.

d. Fly poison is of value, but great care should be exercised in the home, that others than flies do not drink the poison. It must be attractive. Two to three per cent formalin, or three teaspoonfuls to a pint of water, sweetened with

sugar, is satisfactory. Milk may be used instead of water. Expose in a shallow dish, and place a cube of bread in the center to afford a place for settling and sucking.

e. The burning of a little pyrethrum powder will so stupefy flies that at least a meal can be eaten in peace. It is harmless to man.

3. *Protection of Food.* To prevent flies from having access to food, thorough screening and covering of food should be maintained at all times.

The most effective measure of all is that which attacks their breeding.

THE TSETSE FLY AND SLEEPING SICKNESS

Sleeping sickness is widely distributed in Central Africa, and is caused by a protozoan that is present in the blood stream. It

is transmitted by the bite of the infected tsetse fly. The disease is also present in a large number of domestic animals. The parasite undergoes a necessary life cycle in the fly, fourteen to twenty days being required from the time it has fed on the blood of an animal that has the disease. The female fly deposits her larvæ upon the sand, in a shady place. Sunlight is injurious to the larvæ and the pupæ. These flies bite in the daytime, from 9 A. M. to 4 P. M.

Prevention: Clear away all plant growth for at least fifteen feet from the edge of streams of water. As a personal precaution, (1) wear white clothing; (2) protect the legs and the ankles by leggings, the face by a veil, and the hands by gloves; (3) avoid going about except at night, as the fly bites in daytime only.

LICE

This subject is discussed in chapter 51.

TICKS AND MITES

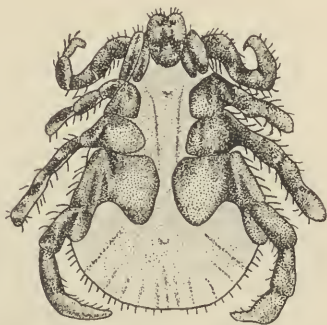
Ticks are not true insects, but are closely related to them, and may very properly be considered with them. They resemble bedbugs. They live on blood of animals entirely. They attach themselves very tenaciously to the skin of the host, and if they are removed quickly, often the head is pulled off.

The eggs are deposited in large masses, and usually upon the ground. The larvæ are small, and six-legged. They attach themselves to some animal, engorge themselves with blood, and then fall to the ground and molt. They then emerge as eight-legged "nymphs," which again attach themselves to some host, fill up on blood, and drop to lose their skin again and become adults.

Ticks and mites are responsible for the following diseases: scabies, or itch; relapsing fever of Africa; Rocky Mountain spotted fever of the United States; tsutsugamushi, or Japanese river fever; and Texas fever of cattle.

Mites and itch are discussed under "Scabies," chapter 51.

Ticks and Relapsing Fever. *Ornithodoros moubata*, the tick of relapsing fever, infests the resthouses along the lines of travel in Africa. It hides in the walls and crevices of the buildings in the daytime, and bites persons sleeping at night. The females transmit the virus to their offspring, and both sexes



Rocky Mountain Spotted Fever Tick

bite and are capable of transmitting the disease. Relapsing fever of Europe and India is transmitted by the body louse. In both tick and louse transmission, the method is by the feces of the insect, which contain the causative organism, and are rubbed into the wound produced by the bite.

Prevention: Avoid places infested with bedbugs, lice, and ticks. Native houses are especially to be avoided. As ticks bite at night, a light may give some protection.

Ticks and Rocky Mountain Spotted Fever. Spotted fever is a very severe disease, resembling typhus fever, and is found in certain sections of Montana, Idaho (notably Bitter Root Valley), Wyoming, and Northern California. It prevails during the season of the year when ticks are abundant (in the spring months). It is a disease of the rural district. Rodents—ground squirrels, chipmunks, mountain rats, prairie dogs, *et cetera*—appear to be the reservoirs of the disease. The ticks feed also on antelopes, cattle, and sheep.

Prevention: 1. As the ticks require an hour or more to attach themselves to men to feed, a person should look himself over well after being out in the timber and the brush. 2. General destruction of all rodents. 3. Thorough dipping of all sheep and cattle.

PREVENTION OF INFECTIOUS DISEASES

One of the first and most important means for the prevention of infectious disease, is to keep the body physically fit by living clean lives, observing all the laws of health. The Creator has adapted the body not only to the different processes necessary to life, but also to certain functions whereby the body defends itself against disease germs. (See chapter 2.)

Quarantine. All cases of infectious disease should be placed under strict quarantine. No one but those needed for the immediate care of the patient should come in contact with the sick. Proper disposal should be made of all excreta and bath water. (See chapter 9.) All bedding, dishes, and linen used in the sick room should be carefully disinfected, and a thorough disinfection of the patient and the sick room should be carried out following recovery. (See chapter 14.)

The nurse or caretaker of the sick should have nothing to do in the preparation of food for the members of the family. In fact, in an acute infectious disease, she should keep away from the kitchen.

Pure Air. Proper breathing and an abundance of pure air are among the best means of preventing infection. While it is

important that we pay special attention to our food and drink, it is equally important that we pay special attention to the kind of air we breathe and to the manner in which we breathe. Life will persist for many days without food, and for several days without water; but so necessary is air to all the body functions, that life can continue only a few minutes without breathing. Even in the country, we deprive ourselves of the pure air by improper clothing, which interferes with the breathing; and also by sleeping and living in poorly ventilated houses. If more thought were devoted to our manner of breathing and the question of pure air, we should be taking a long step toward the prevention of infectious disease. Care should be given to the ventilation of our homes, and of our schoolhouses and other public buildings. (See chapter 8.)

Water. Next to pure air, we should regard pure water as a requisite to good health and a preventive of infection. Proper bathing to keep the skin in healthy condition, thus favoring elimination, and also regulating the heat of the body, and the drinking of at least six glasses of water daily, are matters which we cannot afford to neglect.

Food. Not only do we need to avoid impure food, and food that carries disease germs, but we should see to it that our food contains all the elements needed to supply the demands of the body.

The diet should be well-balanced. (See chapter 20.) Especially should one avoid overeating.

Exercise. Daily systematic exercise is very necessary to the health of the body, and should be taken regularly, preferably in the open air and sunshine. The Scriptural provision that man should earn his bread by the sweat of his face, was not intended as a punishment, but as a blessing. The body cannot be kept in good health without daily exercise to free perspiration. As sunshine is essential for all forms of vegetable life, so it is essential for animal life, and is a very important factor in raising us above the level of disease. We need to have plenty of it in our homes and in our hearts.

Avoidance of worry and fear is another important matter. Both of these emotions depress the body functions, thereby tending to a condition of the body which invites infectious disease. The greatest cure for worry and fear is a perfect trust in God, a Christian experience which favors right thinking and right living in every respect.

Rest. The same word of God which tells us that man should work to keep in health, also says, "Come ye yourselves apart . . .

and rest a while." The body must have time to rebuild the broken-down tissues. There should be regular periods of rest, which enable the body to make repairs and to raise its defense against disease germs.

Vaccination. Vaccination has accomplished a great deal in the prevention of certain infectious diseases. Especially is this true of vaccination for smallpox and typhoid fever. To be convinced, one has only to compare the death rate of typhoid fever during the Spanish-American War, when thousands of our soldiers died of this disease, with that during the late European war, when typhoid fever was practically unheard of among our soldiers. This gratifying condition was brought about by vaccination against typhoid fever. For a number of years, smallpox has been a comparatively rare disease. Recently there has been a decided increase in the number of cases of smallpox. This is due largely to the fact that the present generation have been negligent regarding vaccination. Under careful antiseptic conditions, vaccination will be followed by no harmful results.

Eruptions and Contagious Diseases

For instruction in the general care of contagious diseases, see chapter 14.

SCARLET FEVER

Scarlet fever is an acute contagious disease. One attack usually protects an individual through life. This disease is also known as scarlatina. Many persons wrongly believe that this latter term is applied to a light form of scarlet fever. In every case, the care should be the same, especially with reference to isolation; because from a very mild case, in which the symptoms are a slight sore throat and a transient rash, the most serious case may be taken.

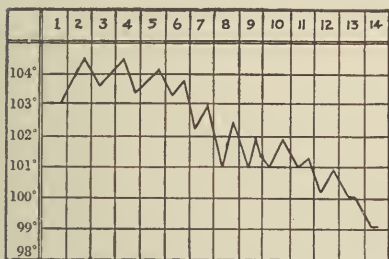
Most people sooner or later have measles, but comparatively few have scarlet fever. The death rate varies from three to thirty per cent of those attacked. Epidemics are more frequent in fall and winter than in summer, and cases occurring in cold months are likely to be severest. After the age of fifteen years, one is not so liable to take scarlet fever. The contagion is given off in the breath, through the mouth and the nose, and not so much by the scales from the skin as was at one time believed.

The urine, discharges from nose, mouth, ears, and any abscesses, are highly infectious.

Symptoms: Symptoms usually appear two to six days after exposure and infection have taken place. The initial symptoms, unlike those of measles, come on suddenly. In most cases, the first symptom is vomiting accompanied by sore throat and headache.

These three main symptoms

of the first day are followed by a high temperature (104° to 105°). The earliest signs of the disease are usually to be found in the throat. This is red and inflamed, strongly suggestive of tonsillitis. Other signs observed at this time are loss of appetite, coated tongue, restless sleep, muscular pains and fatigue. Convulsions may be one of the first symptoms with very young or weakly children.



Fever Chart in Scarlet Fever

A child who has been previously well will without cause suddenly vomit. In many cases, the vomiting is frequently repeated, forcible, and without nausea. This is soon followed by a more or less severe headache, and soreness of throat when swallowing. The fever soon begins, and may be very high the first day, continuing high for two or three days, and above normal for about a week, gradually disappearing about the seventh day. The rapidity of the pulse will correspond with the rise of temperature. The urine will decrease in amount with the high temperature, and may be very dark in appearance. A number of examinations of the urine should be made by the physician, because of the frequency of nephritis as a complication. (See chapter 58.) The tongue is coated white; but on the second day, the tongue may take on its peculiar appearance, the reddened papillæ projecting through the coating, giving the tip, at least, the appearance of a strawberry. The throat condition may advance, showing great redness, with enlargement of the glands under the lower jaw. The rash generally begins (differing from measles) on the body, and later extends to the face. The color varies from a pink to a bright scarlet. On close inspection, it is seen to be made up of very minute points upon a reddish ground, giving the appearance of a uniform blush, not blotchy, but diffuse and even. (See color plate, page 27.) There may be swelling of the skin, with intense burning and itching. When the rash is fully out, the attendant may draw the finger over the body, and a white line will remain for some time on the patient's skin.

There is often a peculiar pallor about the mouth, which is characteristic. Although the face is red, there is commonly this characteristic paleness on each side of the nose and around the lips. In six or seven days, the rash usually has disappeared, fading away in the order of its invasion. Sealing off of the dead skin is very prominent in scarlet fever. The more intense the rash, the greater the sealing. The process may begin on the face as early as the third day, and then progress over the body. It continues longest where the skin is thickest, as on the hands and the feet. The scales from the face are powderlike. Almost entire gloves may peel off from the hands. This sealing ordinarily takes about four weeks. Sometimes the patient comes under observation for the first time during sealing, the history of the first symptoms being absent.

Complications and Results. The complications of scarlet fever may be numerous, and at times are quite severe.

Inflammation of the back of the throat (pharyngitis), with a grayish membrane, often resembling that of diphtheria, but

due to different disease germs, may be present. The tonsils and surrounding tissues are inflamed and swollen, as are also the glands of the neck. The infection often involves the middle ear.

Inflammation of the ear (otitis media) is the most frequent complication, and is due to extension of infection from the throat along the Eustachian tube into the ear. It is one of the common causes of deafness in children. It may occur any time in the course of the disease. The infection may extend from the ear to the membranes of the brain, and may produce abscess of the brain.

Inflammation of lining membranes and valves of the heart (endocarditis) is a dreaded complication of scarlet fever. This may mean a valvular lesion for life.

Enlargement of the glands of the neck (cervical adenitis), resulting sometimes in their breaking down and sloughing, may cause, as late as the fifth or the sixth week, suppuration or formation of pus in the glands.

Inflammation of the kidneys (nephritis). (See chapter 58.) The presence of albumin in the urine may be detected in nearly all severe cases of scarlet fever. In many, this may be due only to the rise of temperature; but in those with severe throat difficulty and septic complications, a true nephritis may take place. Although a complication, it may occur as a sequel, coming on in a child well advanced toward recovery. Look out for the kidneys throughout the attack of scarlet fever, and in particular at the end of the third week. Nephritis may be prevented by careful nursing. Do not allow a child to leave its bed until directed by an attending physician. Use care in the choice of food, and avoid exposure to drafts.

Other important complications which may occur are chorea (St. Vitus's dance), pleurisy, pneumonia, and rheumatism. But the various complications may be prevented by proper care and nursing.

Treatment: The health authorities must be notified; or when a physician is called, he will send in the notification. As in all contagious diseases, isolation is absolutely necessary. The patient and the immediate attendants should be placed in a suite of rooms as far as possible from the general rooms of the rest of the household. Nobody except those in attendance should be allowed admission to the sick rooms. All unnecessary furniture, hangings, and picture frames should be removed from the room. Separate dishes and eating utensils should be used. The room should be, of course, well ventilated and heated.

The Health Department authorities will not allow other members of the family to mingle with outside children. It is advis-

able to keep careful watch of them, that in case they have become infected, treatment may at once be instituted. Keep the patient in bed at least three weeks. The family should not wait upon the patient indiscriminately. Assign one regular attendant, who must use care in disinfection before associating with the remainder of the family.

In the treatment, it is necessary to promote elimination, to maintain vital resistance, and to sustain the circulation. Water should be freely given, since the kidneys are liable to congestion. Lemonade, orangeade, and grape juice are allowable.

The first treatment should be elimination (by sweating). If the rash has not already appeared, or begun to appear, it will usually be brought out by the initial hot treatment,—a hot foot bath with a hot drink. A hot pack can at times begin the treatment. A daily tepid or cool bath is of service and is refreshing. Should the temperature range high, the bath may be made cooler and repeated several times. Extreme cold baths should be avoided. The head should be kept cool. Headache, sleeplessness, and delirium will be relieved by the application of the ice bag to the head.

For sore throat, fomentations followed by heating throat compresses may be used. (See chapter 10.) For the pain in the throat, nothing is more serviceable than the application of an ice bag to the neck. In older children, the sucking of small pieces of ice is very agreeable and beneficial. Mouth, nose, and throat should receive daily attention. They may be sprayed, swabbed, or douched with some mild antiseptic, as a solution of hydrogen peroxide. Dobell's solution, listerine, glycothymoline, or any of the alkaline antiseptics. (See chapter 12.)

Earache or Discharge. If the patient complains of earache, or a discharge is seen coming from the ear, call your medical attendant's attention to it at once. Nothing is better for earache than the application of heat. This is best accomplished by filling a common rubber fountain syringe bag or small enema can with water at a temperature of 105° F. Raising this just above the level of the ear, allow the warm water very gently to enter the external opening of the ear. When a discharge is present, the ear may require douching. This is done in the same way, with two per cent boric acid solution instead of water. After cleansing the ear, dust in boric acid powder and insert gently a small pledget of absorbent cotton in the opening of the external ear.

If kidney complications appear before fever has ceased, avoid cold treatments. Prevent exposure to cold, and keep the patient in bed. The bowels must be kept freely open with saline laxatives.

The diet must be entirely milk and cereals. Water should be given in abundance. The object is, to relieve the kidneys of part of their work. Sweating is to be encouraged by hot packs and baths. Hot normal saline enemas are very useful.

Heart Complications. The nurse should call the attention of the physician to any variation in pulse, rapid or irregular. Prevent physical exertion.

Diet. With the rise in temperature, the appetite is impaired and the digestive functions are below par; therefore it is necessary to provide food that is easily digested and does not call for additional work on the part of the digestive organs. The kidneys are very easily disturbed in this disease; so food that is irritating to the kidneys, or throws extra labor upon them, should be eliminated from the diet. We know that meats and meat broths demand increased kidney work. The requirements are that the food be bland and nutritious. Milk with cereals, toasts, zwieback, any breakfast foods, and fruit juices will meet all these requirements.

Scaling of the Skin (Desquamation). Use a daily oil rub with good olive oil, lanolin, or coconut oil. Before anointing the skin, use a carbolie soap sponge.

Quarantine. Quarantine must be enforced until scaling, sore throat, and albuminuria (presence of albumin in the urine) have completely ceased. This is never less than six weeks.

MEASLES

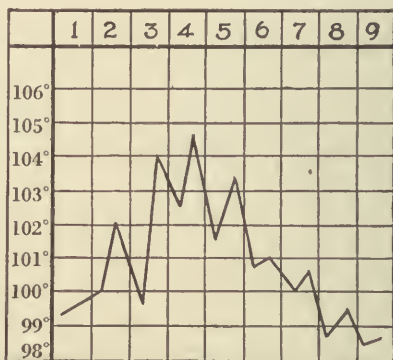
Measles is more widely prevalent than any other eruptive fever. It is the most contagious and frequent of the common diseases of childhood. Few people reach adult life without contracting it. All people, sexes, ages, and classes are susceptible. Mortality is low except among infants and weak children, in whom it may reach to thirty or forty per cent. Measles is contagious from the earliest symptom. After exposure, usually ten days pass before the first signs are observed, which are those of an acute cold. Four days later, or about the fourteenth day, the rash appears. The disease is thought to be more contagious in the earliest stages, before the rash begins, the infection being given off from the mouth and the nose by the breath. Only a short exposure is required to communicate the disease. The infectious agent is chiefly disseminated by minute droplets that are given off during coughing and sneezing. Infection from scales during scaling of the skin has been questioned.

Symptoms: The symptoms begin gradually, fever and catarrhal symptoms increasing steadily up to the appearance of

the eruption. The patient begins to sneeze and feel chilly, the nose runs, the eyes are watery and irritated, and there is a feeling of tiredness, inability to sleep, restlessness, and a hoarse, hard cough, indicating that the catarrh has extended to the larynx and the trachea. In this stage, before the rash has appeared, the physician sometimes questions whether the patient is suffering of an acute cold or a beginning bronchitis. The cough may be very distressing, and is harsh, dry, and unproductive; little and sometimes no phlegm being raised. There may be soreness and pain in the chest. Before the rash appears, on the fourth day, there may be found in the mouth, on the inside of the cheeks, opposite the grinding teeth, small white-blue spots surrounded by a pink or red area, which are characteristic of measles. These are called Koplik's spots, after the physician who first described them.

The lining of the throat becomes red and glossy; and in the roof of the mouth, just in front of the palate, may be seen little raised specks. These usually occur before the skin eruption.

In most cases, the rash appears on the third, fourth, or fifth day of the disease; in the largest number, on the fourth day. The fever, which was high in the early stage, may disappear before the rash comes, but may return as the skin breaks out. The rash appears as well defined, separate spots, resembling fleabites (see color plate, page 26), first seen behind the ears, on the neck, at the roots of the hair, on the forehead, and only afterwards on the trunk and the limbs. These two characteristics differentiate this rash from that of scarlet fever. The rash of the latter appears first on the trunk, and the spots are extremely small. The measles eruption becomes brighter, and may be arranged in groups, taking on a crescentic outline. The rash may be very scant or very profuse. It is hardly ever so abundant but that little islands of natural skin may be seen scattered about, and in this way it differs from scarlet fever. The eruption on the face may begin to fade away before it is fully out on the legs. At the height of the eruption, the face is swollen and actually looks "boiled," which is very characteristic. As time passes, the eruption may take on a purplish hue. During the rash, the eyes of



Fever Chart in Measles

the patient are very sensitive to light. The cough is still very discomforting, and the hoarseness continues. Desquamation, or scaling, begins after the eruption disappears, with a fine, silvery scaling, very different from that of scarlet fever.

Measles may occur in a form so light that it is hardly suspected; or it may occur in a very severe form, accompanied by very high fever, delirium, dry, cracked tongue, weak, rapid pulse, coma, and intense nervous symptoms. Complications in well-cared-for cases are not frequent; but in those not properly attended, many disorders may arise, principally bronchopneumonia, middle ear abscesses, severe eye disease, heart affections, and mouth trouble. Tuberculosis not infrequently follows measles.

Treatment: Isolate the patient. Put him to bed in a large, well ventilated room. The bed should be so placed that the light does not fall on the face and the eyes. The room should be kept at an even temperature, 65° to 70° F.; and it should be shaded, but not necessarily darkened. Give the patient plenty of fresh air; for in so doing, you make him more comfortable, and may shorten the course of the disease, and above all, may prevent such serious complications as bronchitis, laryngitis, and bronchopneumonia.

In the care of the patient, dependence must be placed on the attending physician, but there are some simple remedies that will add to the comfort of the patient. At the beginning of the difficulty, give a hot foot bath or a hot bath with a hot drink. During the period of coryza (cold in the head) and bronchitis, fomentations may be given night and morning, followed by an oil rub on the chest. Hot or warm sponging may be given night and morning to combat the temperature—more frequently if the fever runs high. Itching and burning of the skin may be helped by inunctions of plain or carbolized vaseline, or by bathing with a solution of bicarbonate of soda. Bathing with a weak carbolic soap is also useful.

For eye irritation, the use of an eye drop four or five times a day is beneficial. A four per cent solution of boric acid may be employed. For restlessness, very material benefit will result from a warm sponge bath. For diarrhea, in addition to medicine prescribed by the physician, hot boiled milk thickened with a cereal is good.

To diminish the chances of pneumonia, keep the patient in bed during the attack, and avoid exposures, but allow plenty of fresh air. The germs that produce pneumonia and blood poisoning are found in the mouth. Hence the mouth should be systematically disinfected with Dobell's solution and other alkaline washes.

Diet. If the patient is a nursing child, the amount of milk should be reduced. The diet should be light but nourishing. Milk and cereals, and cereal gruels, may be alternated with milk toast, zwieback, soft-boiled or poached eggs, orangeade, lemonade, grape juice, and plenty of water. Omit from the diet, in all eruptive fevers, meats, broths, and meat soups.

Quarantine. For a period of not less than two weeks before removing the patient from the sick room, give a full hot carbolie soap bath, and supply an entire set of fresh clothing. Fumigate the room as previously suggested.

GERMAN MEASLES

This is sometimes called French measles or rubella. It is rarely seen except when there is a prevailing epidemic, and is characterized by a short invasion, with mild, indefinite symptoms, simulating measles and sometimes scarlet fever.

It can be communicated at any time during its course, but is especially contagious during the early stage. Epidemics prevail in winter and spring. Persons of all ages are susceptible except infants under the age of six months. Previous attacks of measles and scarlet fever do not protect from it, neither will an attack of German measles protect from an invasion of measles or scarlet fever.

Incubation varies from seven to eighteen days or even longer.

Symptoms: Invasion is seldom more than a half day, and as a rule, is gradual, and the symptoms are mildly catarrhal, with feelings of general depression, slight fever, headache, pharyngitis, and rarely with cold in the head, and redness and watering of the eyes. At other times, there may be nosebleed, vomiting, convulsions, headache, or dizziness; but these are exceptional. The throat is sore and reddened to a greater degree than in measles, but less than in scarlet fever.

Eruption. The child may awake in the morning covered with the rash, and no other symptoms be present. The eruption usually begins within twenty-four or forty-eight hours after other symptoms are noticed. It makes its appearance first on the face, then spreads rapidly over the whole body, and lastly over the lower limbs. This may be complete in twenty-four hours. It varies considerably in character, but resembles measles more than any other rash, although it may resemble scarlet fever. It lasts two or three days, then fades in the order of its appearance. The sore throat is of mild type, as is also the fever. The rash is of a bright red color, but the regular crescentic arrangement so characteristic of measles is lacking. Scaling is light and branny,

and sometimes entirely wanting. In some epidemics, scaling has not occurred.

There are few diseases so free from danger, and complications are rare. Enlarged glands may break down and develop abscesses.

In a case of German measles, it is very necessary to make a definite diagnosis, in order to distinguish it from measles and scarlet fever. The characteristic thing about the disease is the well marked rash with a rapid appearance and disappearance, enlargement of the glands in the neck, mild symptoms, and slight fever.

Treatment: Be sure of diagnosis. If in doubt, call a physician. In any rise of temperature in childhood, see that there is a movement of the bowels. If necessary, give a hot enema, a hot bath, and hot water to drink. Rest in bed, with light diet, including milk, cereal, and fruit juices, is advisable. The enlarged glands of the neck may receive cold or hot applications. Often the first are preferred. As in measles, inunctions of cold cream, cocoa butter, eucalyptus in petrolatum, and other oily substances may relieve itching and help scaling.

Quarantine. A child that has been exposed to infection should not be allowed to return to school before a period of two or three weeks has elapsed since the last exposure. A child that has the disease should not be allowed to return to school until one month has elapsed since the beginning of the attack.

SMALLPOX (VARIOLA)

This is an acute infectious disease characterized by an eruption that passes through the successive stages of papules, vesicles, pustules, and crusts.

This disease was first recognized and described in the fifteenth century, although it must have existed for centuries before. At that period, it was confined almost wholly to childhood. This was because nearly all the adult population had had the disease, being the survivors of smallpox in childhood. Smallpox at that time attacked almost all those who were exposed to its influence, unless they had already had an attack of the disease.

A century of almost universal vaccination has gradually given an immunity, causing smallpox to degenerate from a scourge to a disease of rare mortality. Continuing vaccination would in time cause the disease to be nearly stamped out. Therefore parents should see that their children are vaccinated in infancy and again at puberty. Vaccination at the present time, with the serum prepared in sterile tubes and in the hands of a clean and expert physician, is harmless.

The germ causing smallpox is unknown. All ages are liable to the disease. Dark-skinned people are especially susceptible. The contagion exists in the eruption and in the dry scales, and may



A father afflicted with smallpox, holding his young son, who has been vaccinated, and without danger to the child

be transmitted from dead bodies. A child in the mother's womb may have the disease if the mother has it.

Symptoms: It takes from twelve to fourteen days for the disease to develop after infection occurs. So indefinite are the beginning symptoms, that they are sometimes mistaken for influenza. Three or four days of general indisposition may precede the invasion. This is followed by a severe chill, intense headache, excruciating pains in the back and the limbs, vomiting, fever, loss of appetite, and at times convulsions. In many cases, there is an initial rash (entirely separate from the real eruption that appears

later), which may resemble the rash of measles or scarlet fever. The fever begins abruptly high, and gradually lowers until the fourth day, or such time as the eruption makes its appearance, when the temperature may be normal or nearly so. This is a period of great importance, as the patient, who formerly had severe pains and high fever, and was generally ill, is now free from fever and pains, and may consider himself well, and thus expose others to the disease. This period lasts for only a few days, until the eruption becomes pustular. The temperature then goes up to 104° to 105° F., and the patient becomes desperately ill.

The first manifestation of the rash consists of papules, especially on forehead, neck, and wrists. (See color plate, page 28.) Under the finger, the papules feel like small shot. They gradually fill with fluid, which is first a clear serum, becoming a vesicle and multilocular; that is, they are composed of several pockets, and if they are pressed with the finger, the fluid will only partially escape, as some of the pockets are still unbroken. These vesicles become depressed at the center (umbilicated), having a small depression on the summit of the vesicle. In two or more days, or about the eighth day, the vesicles become filled with a cloudy material of a purulent character. The eruption is now in the pustule stage. The pustules begin to dry in a few days, and the crusts are formed. Prostration is great during the disease. Death may occur at any time, but the danger is greatest during the rise of temperature. Associated with the increased fever will be found a rapid and feeble pulse.

Varieties. *Discrete variola*, the lighter form, has only scattered papules on the skin.

Confluent smallpox, the old-fashioned kind, is very severe. This type is characterized by very grave symptoms, and an eruption similar to that described; but the papules, the vesicles, *et cetera*, are very close and thickly set, accompanied by great swelling of the parts. Superficial abscesses are common. The prospect for recovery is doubtful in this class of cases.

The hemorrhagic type is the most serious. Hemorrhages occur in the skin around the vesicles and into the pustules. Blood is found in the vesicles, instead of serum. As a rule, death follows speedily.

Varioloid is a form of variola modified by vaccination. The symptoms are mild. The eruption passes rapidly through the different stages. There is no fever during the eruptive stage.

Complications are broncho-pneumonia, laryngitis, œdema of glottis, gangrene of the skin. Abscesses have occurred in the pock marks.

Probable Outcome: In the unvaccinated, the mortality runs from twenty-five to thirty-five per cent; in the vaccinated, the mortality is very low.

Diagnosis: It is sometimes necessary to differentiate this disease from chicken pox.

SMALLPOX

Eruption contains serum, later pus.
Most abundant on face and fingers.
Various stages of eruption observed at points removed from each other.
Pin prick of vesicles does not cause complete collapse.
Secondary fever usually present.

CHICKEN POX

Eruption contains only serum.
Most abundant on back and legs.
Various stages side by side.
Pin prick of vesicles causes collapse.
Secondary fever absent.

Prevention: Protection against smallpox by vaccination is one of the best attested facts in medicine. Parents and physicians should see that every young infant is vaccinated. (See color plate, page 25.) Vaccination produces an immunity from smallpox which, though it is not always absolute, is very highly protective. Smallpox itself may not entirely protect the patient from future attacks. There are instances on record of a second attack of the disease. The objection has been raised, that vaccination may introduce into the patient various diseases, as syphilis and tuberculosis. To-day, with improved and pure vaccines, this is an impossibility, although it may have happened in the past, when humanized vaccines and impure bovine vaccines were used. The only source of danger is the introduction of disease germs by means of the instruments, the dressings, or the hands of the attendants. This may happen in the case of any wound, but can be avoided by heeding the principles of asepsis and antisepsis.

Treatment: The first duty in the treatment of smallpox is to isolate the patient; and of course this will be required by the health officer of your community. A separate house should be used if obtainable, and a room with good ventilation. Light is to be restricted as much as possible. It has been claimed that good results have been obtained by excluding all but the red light. This can be accomplished by having red hangings, red lamp shades, and red curtains on the windows. This is said to influence favorably the progress of the eruption.

The rise in temperature can be combated as in other fevers, by hot baths, hot water drinking, and hot cleansing enemas. If the bath is not obtainable, the hot sponging may be substituted. Keep the room at an even temperature, with a good exchange of air, but use care that the patient is not exposed to drafts.

Diet. This should be liquid and nutritious, consisting principally of milk, cereals, and gruels. Water should be freely given,

as well as orangeade, lemonade, grape juices, and other fruit juices. Pain in the back and limbs, which is so common in the beginning of the disease, can sometimes be relieved by anodynes (which, however, should be given only by a physician), or by the application of hot water bags or hot fomentations.

General conditions should be watched—temperature, pulse, respiration, and the amount of prostration. Any unusual changes should be reported at once to the attending physician.

Pitting. Many efforts have been made to prevent pitting, but not all have been successful. Good results have followed bandaging the face and hands with ten and twenty per cent solution of ichthyol. Another method is to keep the parts constantly moist by covering them with cloths moistened with a weak solution of carbolic acid, or a one to one hundred oily solution of carbolic acid. A carbolized vaseline of the same strength is sometimes used. Keeping the crusts well soaked is of prime importance. When carbolic preparations are used, have the urine examined for signs of poisoning by absorption.

The patient should remain in quarantine about five weeks, or until scaling has ceased and the skin is clean and smooth.

CHICKEN POX (VARICELLA)

Chicken pox has often been confounded with smallpox, but its existence as a separate disease has been admitted for years. Neither disease protects against attacks of the other. Vaccination has no influence on chicken pox.

The disease is characterized by an eruption of papules, which change to vesicles, with mild constitutional symptoms. Chicken pox may be taken directly from an infected person, or may be carried by a third person or on infected articles. Children are mostly affected, but adults may contract the disease. One attack usually protects for life. The incubation period is from ten to sixteen days.

Symptoms: Chicken pox begins with a slight fever (100° to 101° F.), a feeling of chilliness, and aching in back and extremities, with vomiting. After a period of about twenty-four hours, the rash comes out in "crops," which are very characteristic, appearing first upon scalp and face, then thickest on the back and the chest. The appearance of successive crops may be separated by a day or two. (See color plate, page 28.)

The eruption has three distinct stages. First there are small red spots or papules resembling flea or mosquito bites. Soon there appear on these red spots small water blisters, which in time are followed by the drying process, with the formation of the crust or scab. As the eruption comes in successive "crops,"

we thus have at one time all forms of eruptions,—red spots, blisters, and scabs. The scabs, in the course of a few days, begin to fall off, and leave behind a slightly reddened area, which soon assumes a natural color. Pitting after chicken pox is uncommon, but does sometimes occur. With the disappearance of the rash, recovery is rapid, and there are seldom complications, although erysipelas may develop in the poeks when they are deep. Inflammation and suppuration of glands have also been found in some cases.

The disease is infectious as long as the scabs or ulcerations persist, which is usually three or four weeks. During this time, quarantine and isolation should be continued.

Diagnosis is made easy when all stages of the eruption, papules, vesicles, and crusts, are present at the same time.

Treatment: Although the disease is not serious, isolation should be enforced in schools and institutions. In a home, quarantine is not so necessary, unless other children of the family are delicate. Isolate until every scab has fallen off.

Itching, when annoying, may be allayed by sponging with a solution of baking soda, one teaspoonful to a pint of hot water, or with a one per cent carbolic acid solution. Carbolic soap baths may be given, or carbolized vaseline applied. When crusts have formed, an ointment containing two per cent ichthyol should be used. Care should always be exercised to keep the skin clean by means of hot baths.

What has been said in reference to general care and diet in other contagious diseases will apply here.

MUMPS

The digestive fluids for the mouth are supplied by the salivary glands. This group of glands consists of two *parotids*, located one on each side of the face, deep in the cheek, and just in front of the ear; the *submaxillaries*, lying under the lower jaw; and the *sublinguals*, which are located under the tongue. The glands can be infected by way of their ducts, which empty into the mouth, or by way of the blood supply. The ducts of the parotids empty on either side, in the lining of the cheeks, just opposite the upper second molar teeth, and are more exposed to infection, the other glands being protected by the tongue.

Mumps is an epidemic contagious disease characterized by swelling of the parotid glands and sometimes of the other salivary glands. The constitutional symptoms are usually mild. Mumps has no mortality. There is very little susceptibility under one year of age. The disease oftenest attacks between one year and puberty, but sometimes attacks adults.

The period of time that elapses between infection and the appearance of the first symptoms may vary from ten to twenty-two days. Infection is direct, and not through a third person.

Symptoms: The local symptoms are often first to attract attention. In some cases, the disease begins with several days of headache, loss of appetite, vomiting, pains in the back and the limbs, chilliness, sweating, and ringing in the ears. There is a slight fever in the mild attacks, 100° to 101° F.; in the severe form, 102° to 104° F.

The swelling begins below and in front of the ear, and gradually extends upward and backward. Ordinarily, pain precedes the swelling; and it is increased by movement of the jaw, by pressure, and by acid substances in the mouth. Opening the mouth wide is difficult and painful. In most instances, the saliva is scant and the mouth dry. Some foods introduced into the mouth cause great discomfort, due to the stimulation of the flow of saliva. Swallowing is painful. Sometimes the disease is very distressing, because many nerves and blood vessels pass through and near the substance of the gland, and the swelling presses upon them. Frequently the disease affects both sides, but one side is usually attacked before the other. There is no formation of pus or abscesses, unless from complicating infection. The course of the disease is three to six days, but may be extended if complicated.

Complications: In childhood, the complications are few and generally unimportant; but beyond twelve or fifteen years of age, this disease, although of a mild character, may be seriously complicated. Such conditions as inflammation of the membranes of the brain (meningitis), with delirium and coma; swollen and inflamed testicle (orchitis); inflammation of the breast (mastitis); inflammation of the ovaries (ovaritis); pneumonia; deafness; and even heart difficulties, may be among the complications.

Treatment: The disease is self-limited. The treatment consists in keeping the patient quiet, with rest in bed in a room with even temperature, during the acute stage. A liquid diet, with cereals and eggs, may be given.

Keep the mouth clean with antiseptic mouth washes, such as one part hydrogen peroxide in ten parts of water. The gland can be protected with flannel or absorbent cotton. If pain is severe, heat may be applied. If the patient will permit, the ice bag is a very soothing application. Hot, tepid, or cool sponging of the body is useful when there is a rise of temperature.

Quarantine. In schools, institutions, or where there may be those who are susceptible, a three weeks' quarantine is advisable. Let at least one week elapse after subsidence of all swelling.

Typhoid Fever

Typhoid fever is sometimes called abdominal fever, enteric fever, or autumnal fever, and may be defined as an acute infectious disease caused by a specific germ, the typhoid bacillus.

Causes: Any intestinal or digestive disorders that may alter the digestive juices; errors in diet; contaminated food and water; unhygienic surroundings; anything that lowers body resistance, thus breaking down the body defenses against invasion by disease germs,—may serve as a predisposing cause. Dr. Osler says the disease is carried principally by food, fingers, and flies. It is more common in autumn than in other seasons; hence the name “autumnal fever.” Typhoid fever is most likely to occur between the ages of fifteen and thirty.

The exciting cause is the typhoid bacillus (see page 117), which is taken into the body through food or water that has been contaminated by discharges from a typhoid fever patient, flies, *et cetera*. (For a manner in which food or water may be contaminated, see chapter 67.)

Symptoms: The onset is usually gradual, with a tired feeling and general weakness. There may be headache and nosebleed. The fever rises higher each day, until by the end of the first week it may reach 104° or 105° , the evening temperature being from one to two degrees higher than the morning temperature. During the second week, the temperature varies but little in the daytime. The pulse is rapid—from 90 to 110 in most cases. The appetite is lost, the tongue is coated, and the teeth and the lips are covered with a brownish coat.

Often there is diarrhea, but there may be constipation instead. The stools are very offensive. The abdomen is distended and tender on pressure. At the end of the first or the beginning of the second week, rose-colored spots appear on the skin. These are most abundant over the abdomen, yet they may appear on both the chest and the back. At the end of the second or the beginning of the third week, the fever usually begins to subside. The temperature falls gradually, but is not considered normal until the evening temperature stays at 98.6° .

Nervous Symptoms: The onset may be with convulsion, severe headache, and delirium.

Intestinal Symptoms: The onset, with severe gastrointestinal symptoms, such as vomiting and diarrhea, may be similar to food poisoning or even acute appendicitis.

Respiratory Symptoms: There may be nosebleed. Cough is a common symptom, and the picture may be that of bronchitis, or even pneumonia.

Serious Symptoms: The most serious symptoms are continuous high fever, delirium, extreme abdominal distention, and hemorrhage from the bowel.

Symptoms of Hemorrhage: Sudden drop in temperature; rapid, weak pulse followed by a dark discharge from the bowel.

Symptoms of Perforation of the Bowel: Sudden pain in the abdomen, oftenest on the right side; rapid drop in temperature; later, diffuse pain in the abdomen, and rapid, weak pulse, with other symptoms of peritonitis.

Relapse is a repetition of the characteristic symptoms of the original disease after convalescence has begun, and occurs from seven to ten days after the beginning of convalescence. It usually runs a shorter and milder course.

Special Features: During the early days of the disease, the face is flushed and the eyes are bright; but by the second week, the expression becomes listless and dull.

As a rule, the skin is dry. Sweating is not common except in the late stages or during convalescence, and is caused by weakness. Rose-colored spots appear from the seventh to the tenth day, first over the abdomen, then over the trunk. They come in successive crops, each crop lasting from two to three days. There is a peculiar odor from the skin which is quite marked in some cases.

Walking Typhoid. In these cases, the symptoms are mild. The patient does not think he is sick enough to take to his bed, or even to consult a physician. Such cases are dangerous, because of the liability to hemorrhage from the bowels, due to lack of treatment and to improper diet. Again a person may have typhoid fever without a rise in temperature. In mild cases, normal temperature may be reached by the end of the second week. Relapse is frequent in these cases.

GENERAL CARE

The patient should be put to bed in a light, well ventilated room. (See chapter 14.) All carpets, rugs, drapery, and unnecessary furniture should be removed from the room.

A temperature of 65° to 72° F. should be maintained in the room. The patient should use the bedpan from the beginning of the disease until convalescence is well advanced, because of danger of hemorrhage or perforation of the bowel, also heart complications.

All linen and dishes should be carefully disinfected. The nurse should have nothing to do with the preparation of food. All excreta from the patient should be disinfected and disposed of in the proper manner.

Diet. The patient should have water freely to drink. Food should be liquid or semisolid, such as gruels, vegetable broths or soups, buttermilk, and milk. Eggs may be used moderately. Buttermilk is an excellent food for fever patients. Fruit juices with very little or no sugar should be given freely. The patient should have food at regular intervals—every three or four hours, the time depending upon the amount taken at each time. It is ordinarily not best to awaken a sleeping patient to take food. Owing to the long continued fever, it is necessary to encourage typhoid fever patients to take a liberal diet. (See chapter 14.)

TREATMENT

A daily enema should be given. If good results are not obtained, it may be well to give a dose of castor oil. Pay special attention to the mouth and the teeth, cleansing daily with some alkaline solution, also rinsing the mouth thoroughly each time after taking food.

For the fever, cold sponge baths should be given when indicated. As far as possible, the temperature of the patient should be kept below 102° or 102.5° . If the patient chills with the cold sponging, tepid or even hot sponging may be employed, to reduce the fever. Other measures to reduce temperature are an evaporating wet sheet pack, a wet towel rub, and cool enemas. A cold compress to the abdomen, changed every fifteen minutes, will often control the temperature and add greatly to the comfort of the patient. The same may be said of the cold compress to the head. Also twice a day, two or three short fomentations should be given, either to the abdomen or to the spine, followed by a saline or soap sponge. The back should be bathed frequently with alcohol to prevent bed sores.

No solid food should be allowed until the evening temperature has been normal for ten days. For delirium, a cold compress to the head should be employed, and in no case where there is delirium or other marked nervous symptoms should the patient be left alone. If hemorrhage from the bowel occurs, all food must be withheld for eight or ten hours. Apply an ice bag to the abdomen and keep the patient absolutely quiet.

Perforation. The treatment of perforation of the bowel is a surgical procedure.



A sanitary dairy means clean milk for the family.

Convalescence. During convalescence, the patient should have tonic treatments (see chapter 10) and a nourishing diet, one rich in iron (see chapter 20).

Before the patient is permitted to mingle with the family, he should have an antiseptic bath; and repeated laboratory tests should be made of the urine and the feces, to determine whether the patient is still harboring typhoid germs and thus may be liable to communicate the disease to others.

PREVENTION

When a disease is contracted, treatment comes first. But in all diseases, prevention is the important thing. Note the following object lessons:

Infected Water. Typhoid fever is one of the best illustrations of a communicable disease, and one which can be easily prevented and entirely stamped out. In the year 1899, in the city of Philadelphia—a city then of 1,300,000 inhabitants—there were 7,985 cases of typhoid fever, with 948 deaths. These cases were caused by an impure water supply.

Human Agency. In the year 1914, there occurred in one of the smaller cities of California an epidemic in which there were ninety-three cases and three deaths. These cases were caused by eating Spanish spaghetti prepared by a woman who was a typhoid carrier. Of 150 persons who partook of a public dinner, the above number developed typhoid fever. This dish was prepared in the usual manner, by baking; but the mass of food was so large that the heat, instead of sterilizing or completely destroying the germs, failed to penetrate to the center sufficiently, thus furnishing, instead, the conditions favorable to the growth of bacteria. Heat penetrates slowly in certain kinds of food; hence cooked food cannot be considered free from danger, unless heated sufficiently to sterilize it completely.

Infected Milk. Another epidemic occurred during the autumn of 1920, in Hillsdale, Michigan, a city with a population of 5,946. There were eighty-three cases, with eight deaths. This infection was traced to the bottling station of a single milk supply of the city. The man who acted as distributor was found to be a typhoid carrier, members of his family having suffered of typhoid fever, and he himself having been sick of an undiagnosed illness about two weeks previous to the onset of the first case in the city. Typhoid fever germs were found in the feces of this man who handled the milk. Had the local health officer stopped the sale of milk as soon as typhoid fever was discovered in this family, the epidemic might have been prevented.

Careful laboratory tests proved conclusively that in both of the epidemics last mentioned, the source of the original infection was a typhoid carrier.

Vaccination against typhoid fever has done much to stamp out the disease. This is well illustrated in the Hillsdale epidemic. No cases of typhoid fever developed among the 1,500 persons who were vaccinated. During the Spanish-American War, which took place before vaccination against typhoid fever was practiced, there were 20,738 cases of typhoid fever among the 107,973 men in the army; in the South African War, there were 25,359 cases; while during the late World War, typhoid fever was comparatively unknown among our soldiers, because all our men were vaccinated upon entering the army service.

Typhoid fever is easily preventable, yet 25,000 people die annually of this disease, and 300,000 more are crippled or incapacitated by it. Ignorance and carelessness open the way for most of the epidemics of typhoid fever.

Erysipelas and Wound Infection

ERYSIPELAS

Erysipelas is an acute infectious disease characterized by inflammation of the skin and the subcutaneous tissue, generally of the face and the neck. The inflammation has a decided tendency to spread, and is associated with more or less fever. Suppuration is rare.

Causes: Erysipelas is caused by a germ, the streptococcus erysipielatis, which finds an entrance through some wound or abrasion, and enters the lymph channels or lymph spaces of the skin or of the subcutaneous tissue.

Lowered vitality renders one especially susceptible to erysipelas. Insanitary surroundings also are a predisposing cause. Many cases are apparently independent of any wound or abrasion of the skin. Often this disease develops from some infection in the nasal passages. It is contagious, and the poison is very resistant, clinging to bedding, furniture, and clothing for some time; hence the necessity for thorough disinfection following a case of erysipelas.

Symptoms: The onset is usually sudden, with chills, and a rapid rise of temperature to 104° or 105° F. Quick pulse, headache, pain in limbs and back, with *malaise*, nausea, and vomiting, may be present; and particularly in children, there may be convulsions. There is likely to be a marked delirium, and acute mania may develop at the height of the disease or during the decline of the fever. In milder cases, there may be, aside from the eruption, only a slight rise in temperature, rapid pulse, and headache. The eruption appears as a shining red area, hot and tender. (See color plate, page 29.) It is swollen and firm, and has a well defined border. Vesicles or blisters often develop. The patient complains of pain and itching in the affected parts. The swelling may be so great as to close the eyes completely and distort the features. The lymph glands of the neck are enlarged. The rash spreads rapidly, as much as one inch in twenty-four hours. After from five to seven days, it begins to fade. At the same time, the fever drops gradually. There is a scaling of the skin. Infection is confined, ordinarily, to the face and the head, often appearing first on the nose. It may, in rare cases, spread over the entire body. This is known as the migrating form.

Diagnosis: The diagnosis is readily made by the eruption appearing about the same time as the chill and fever, and spread-

ing rapidly over the face, the eruption having a sharply defined border, with intense burning feeling.

Probable Outcome: The outcome is favorable except in infants, and in mothers following childbirth. In those whose resistance is already lowered by some chronic disease or by insufficient diet, and in alcoholics, the outlook is very grave.

Prevention: Because of the contagious nature of the disease, one caring for a case of erysipelas should keep away from surgical cases and newborn infants, as well as from mothers who have recently been delivered. If the nurse has any wounds on her hands, and even when this is not the case, the wearing of rubber gloves while treating the patient is a wise precaution. The patient should be isolated.

Treatment: Most cases will get well without any treatment whatever, as the disease is self-limited. The patient should be kept in bed, and have a thorough cleansing enema, which should be repeated daily. A laxative (see chapter 12) also should be given at the beginning of the disease. The patient should have a light but nutritious diet, chiefly liquid. Vegetable broths and fruit juices are especially good. Water to the amount of two to three quarts daily should be given. The room in which the patient is confined should be light and airy, with plenty of sunlight. The patient should be made comfortable by cool or tepid sponging to reduce the fever. Cold compresses to the head add to the comfort of the patient. Treatment that will increase the leucocytes, or white blood cells, with which the body defends itself against infection, should be given; that is, hot foot baths, hot and cold to the spine (see chapter 10), alternating with hot and cold to the liver, and cold mitten frictions twice daily. These are among the best of simple treatments.

Locally, the ice-cold compress over the affected area gives a great deal of relief, and perhaps is as efficient a treatment as can be given. The infection being in the skin, it can be reached directly by the cold application, which inhibits the activity of the germs. Cold also relieves congestion, thereby making the patient more comfortable. Compresses of saturated solution of magnesium sulphate (Epsom salts) applied to the area likewise relieve the congestion; and in many instances, they seem to cut short the disease. Local application of tincture of iodine or iodine ointment are recommended, also ichthyol ointment. It is a question whether the use of compresses wrung out of antiseptic solutions, such as carbolic acid solution, will have any effect on the unbroken skin in these cases.

In case of delirium, cold compresses to the head or continuous wet sheet packs are employed. (See chapter 10.) The delirium is less likely to be violent if careful attention is given to the lessening of the toxæmia. This may be accomplished by keeping the skin active, and especially by thorough cleansing enemas daily, followed by retaining enemas of one pint of water every three hours. This will dilute the poisons and aid in their elimination through the kidneys.

SEPSIS AND BLOOD POISONING (SEPTICÆMIA)

Under this heading may be included septic intoxication, septicæmia, and pyæmia.

Septic Intoxication. This term refers to a group of symptoms produced by absorption of poisons from a focus of suppuration in the body. In this condition, we have the poisons circulating in the blood stream, but not the bacteria. The focus of infection may be an infected wound, a boil, or an abscess. The symptoms may be mild or severe, depending upon the character of the infecting organism and upon the location of the infection and the amount of absorption of toxins. Two or more forms of bacteria may be associated in this condition. In minor cases, opening the wound and setting the pus free relieves the symptoms.

We may also include under septic intoxication the condition present in a number of acute infectious diseases, such as diphtheria, tetanus, erysipelas, pneumonia, and others. In all these diseases, the site of infection is local, and the absorption of poisons from it produces a septic intoxication, causing a group of symptoms common to all; namely, chills, fever, rapid pulse, restlessness, and prostration to a greater or less degree. The symptoms vary in severity from those caused by a slightly infected wound, which in most cases are a slight fever and a general ill feeling, to the severer symptoms before mentioned.

Blood Poisoning (*Septicæmia*). This is a condition in which the pus-producing microorganisms exist and multiply in the blood. Here we have not only the toxins produced by bacterial growth, but also the bacteria themselves, in the blood stream. The germs may enter the blood stream from some local focus of suppuration, and be carried to some other part of the body, and there produce a new point of suppuration. In this way, several points of suppuration may exist in the body. When this condition exists, it is called pyæmia. As far as the symptoms produced are concerned, we may not always be able to differentiate between septicæmia and pyæmia; and we often have both

present at the same time, when the condition is sometimes termed septicopyæmia.

Avenue of Infection. First, the bacteria causing these conditions may gain entrance into the body through wounds resulting from injuries and surgical operations. Second, they may come through the uterus, following labor, miscarriages, or abortions. Third, these bacteria may enter without apparent wounds or abrasions of the skin: but as septic infection does not occur through the normal, unbroken skin, there must have been some slight abrasion of the skin, such as a cut, scratch, or puncture wound, which may have been healed and thus escaped observation. Fourth, infection may have taken place through some one of the mucous membranes of the body. Fifth, diseased tonsils or teeth may be the avenue through which it has gained entrance into the body.

Symptoms of Sepsis and Septicæmia: Symptoms usually set in from three to four days after injury. If there is a superficial wound that has healed, it will probably be found tenderer, more swollen, and the edges slightly reddened. Symptoms may be first announced by a chill or slight chilliness; moderate fever, rising gradually, with daily remissions; pulse small and rapid; tongue dry and coated, and in most cases, red at the margin. The face is pallid, or the skin may have a yellowish tinge. Delirium and prostration are not uncommon. From the seat of the wound will be seen red lines running up the limb, which indicate that the bacteria are entering into and inflaming the lymph channels, thereby gaining entrance into the blood. The lymph glands guarding this area of the body (for instance, if the infection is in the hand, the lymph glands of the elbow and the axilla) will be enlarged. The severity of the symptoms will vary, depending somewhat upon the type and virulence of the infection. Certain types of germs, such as the streptococcus, may cause rapid destruction of the red blood cells.

Probable Outcome: These conditions should always be considered grave. While a large number, especially of the mild cases, recover, yet, since the outcome depends largely upon prompt action, even in the mildest types of infection, trustworthy medical advice should be secured.

Symptoms of Pyæmia: The onset is usually marked by severe chill, during which the fever rises to 103° or 104° F., and is followed by a drenching perspiration; or there may be a prolonged chill or succession of chills, which may be repeated daily or every other day. The pulse is rapid. Nausea and vomiting are common, and there will be rapid emaciation as the disease

progresses. The disease may become chronic and be prolonged for months, with chills recurring at long intervals, and with an irregular temperature. It often simulates typhoid and malarial fever, from which it must be differentiated by the physician.

Treatment: The treatment of these different types of septic infection will be considered together. It is largely the work of the physician and surgeon, and no one should feel himself qualified to meet the situation without competent medical advice. If possible, the suppurating area, if there is one, must be opened and the pus drained. The case must be handled in a manner similar to that of any patient who is seriously ill of an acute infectious disease. The poisons produced tend to affect the heart and the nervous system. Absolute rest must be secured. The patient should be in a pleasant, airy room, with plenty of sunshine. It is a very good practice to expose the wound to the direct rays of the sun, several times a day. This destroys bacteria and stimulates healing. Care should be given to the diet, which should be light but nourishing, consisting largely of liquids. Fruit juices are especially good. The patient should be encouraged to drink freely of water, at least three quarts daily. This aids greatly in eliminating the poisons from the system.

Keep the skin active by proper bathing. If the patient is perspiring freely, a daily soap wash is indicated. Combat toxæmia by careful attention to the bowels, a cathartic at the beginning of the sickness, and a daily cleansing enema. Every three hours, give a retaining enema of one pint of water. This water is absorbed by the system, and aids in washing the poisons out of the body. Treatments to increase the resistance of the patient—hot foot baths, hot and cold applications to the spine, alternating with hot and cold to the liver and the bowels, followed with cold mitten friction—should be repeated two or three times daily. (See chapter 10.) If the fever is high, cool or tepid sponging, together with the cold compress to the head, should be used to make the patient more comfortable.

A prolonged hot bath, followed by a heating compress covered with a mackintosh, or alternate hot and cold applications two or three times a day, with a heating compress worn between the treatments, will aid greatly in combating infection located in a hand or a limb, or in any area where such treatment is possible. As the heart is very liable to be affected by the poisons, it should be guarded by absolute rest in bed, and the use of an ice bag, when necessary. In these conditions, keeping the patient in a cheerful, hopeful frame of mind will greatly improve the outlook.

INFECTIONS OF THE HAND

The function of the hand renders it more subject to injuries than perhaps any other part of the body; but owing to the defenses with which the Creator supplied our body, almost always in minor injuries, and often in severe ones, healing takes place without infection. However, no matter how slight the injury, the wound should be carefully disinfected; for even the slightest wound, such as a scratch or a pin prick, may result in a severe infection or blood poisoning. In fact, a puncture wound is often the most dangerous.

Erysipelas of the Hand. The symptoms and treatment are practically the same as those considered under "Erysipelas."

ERYSIPELOID

Erysipeloid is a local inflammation of the skin occurring in those handling meats, and usually affects the hands. It resembles erysipelas in that there is an extending reddened area and œdema of the skin, and a distinct line of demarcation. It spreads more slowly than erysipelas, having a tendency to spread in all directions. It does not set in with the usual chill. There is but a slight rise in temperature. The local pain may be considerable. Infection dies out in a few days in some part of its extending edge, while still advancing in others, and gradually disappears in from twelve to twenty days. The outcome in most cases is favorable.

Treatment: Treatment does not seem to modify the course of the disease to any extent. Iodine or ichthyol ointment is recommended. Ice-cold applications to the part, or a compress of a saturate solution of Epsom salts, is useful in relieving the pain.

CELLULITIS

Cellulitis is an inflammation of the cellular or connective tissue in any part of the body. In this chapter, we are considering cellulitis of the hand. It is caused by infection, carried into the tissues through wounds, such as abrasions of the skin, scratches, blisters in the palm of the hand, slivers, or other puncture wounds. It is often accompanied by an abscess, which may be merely a collection of pus beneath the dried scab of the wound, or may be more deeply seated.

Symptoms: The symptoms may develop in a few hours or not till several days after the injury. The site of the wound may have an increased redness. There is gradually increasing pain and a gradual extension of the swelling. The hand becomes greatly swollen, and the lines of the skin are obliterated. The hand is held in a characteristic position, the fingers slightly flexed

to relieve the pressure, and thus to relieve the pain. Usually the infection is on the palmar surface of the hand or fingers. Yet, owing to the anatomical relation of structures of the hand, most of the swelling is seen on the back of the hand and fingers. Even physicians have been mistaken in making the incision on the back of the hand to evacuate the pus, thinking, because of the swelling here, that this must be the site of the infection or abscess; but practically always the abscess will be found on the palmar surface. As these infections are of the septic type, the pus-producing germs may enter the lymph channels, and there will be seen the red lines running up the arm and in the affected area, indicating the danger of septicæmia, or blood poisoning. Generally there is a fever, perhaps a slight chilliness, rapid pulse, headache; or we may have all the signs of septic infection, as given in this chapter under "Sepsis and Blood Poisoning (Septicæmia)."

Probable Outcome: In the case of the average person whose resistance is good, with prompt attention and proper treatment, the outlook is favorable.

Treatment: As in other cases of infection, competent medical advice should be sought at once, as the treatment in most cases must be surgical. Preventive treatment consists of careful disinfecting of all wounds, no matter how slight. The best disinfectant is tincture of iodine introduced directly into the wound. If this is not available, scrubbing with ordinary soap may be employed. Puncture wounds should be laid open with a knife by a physician, to allow of thorough disinfection. A continuous hot bath to the part, with sterile water, should be given from one to two hours or longer. If the patient tires, do up the hand in a moist compress wrung out of a solution of boric acid, and cover this with flannel and oiled silk to prevent evaporation. In the majority of cases, this will prevent infection.

If infection has already developed, the part should be put absolutely at rest, the arm being placed in a sling; or, better still, the patient should be put to bed and the hand placed on a pillow slightly elevated. An evaporating compress wrung out of a solution containing alcohol, and saturated from time to time as evaporation takes place, is recommended. This compress should not be covered with oiled silk to prevent evaporation. In many cases, if an abscess has not already formed, the infection may be cleaned up with this treatment, and pus formation prevented.

Another method of treatment is the placing of the part in a prolonged hot bath, followed with a heating compress, as outlined

in the preceding paragraph. This is especially indicated if the infection has gone so far there is no hope of preventing abscess formation. In all cases, one should search for suppuration, which is usually at the site of the wound; and it is urged again that medical advice be obtained. If no wound or abrasion is present, a collection of pus may be detected by the tenderness over the area, which is more acute than over the remainder of the inflammation. The skin over the area may give greater resistance to the touch of the finger. If not located too deeply, the presence of pus may give a yellowish or white tinge to the skin. However, one should not wait until the pus shows through the skin or until the abscess is "ripe" before seeking medical advice. Delay may mean general blood poisoning, or gangrene of the part, as a result of the pressure caused by the swelling, shutting off the circulation. Prompt diagnosis, and an early incision draining the abscess, will in most instances prevent a more serious complication.

Unless the abscess is quite superficial and easily located, usually the physician will give a general anæsthetic in opening the abscess. When this is done, greater care can be taken in making the incision, thereby avoiding injury to important structures of the hand, also the danger of spreading the infection to deeper tissues. After the abscess has been opened and free drainage provided, the alternate hot and cold bath or the prolonged hot bath, followed by a heating compress, as already outlined, will hasten recovery. The water used in this treatment should be sterilized, because of the danger of adding more infection to the wound. In fact, all antiseptic precautions should be used in caring for wounds of this nature. Infection in the hand as well as elsewhere means lowered resistance. Therefore give treatments to raise the body defense, the same as outlined under "Sepsis and Blood Poisoning (Septicæmia)," earlier in this chapter. The same diet, as well as the same general care and treatment, are indicated here.

BOILS AND CARBUNCLES

Boils and carbuncles of the hand should have the same treatment as boils and carbuncles in any other part of the body. (See chapter 50.)

INFECTION OF A FINGER

Owing to the anatomical structure of the hands and the fingers, which controls the extension of suppuration, we have several well defined types of infection in the fingers. A very common point of infection is the end of a finger, especially the index finger, usually caused by a pin or needle prick, a sliver, or

a thorn from a rose or berry bush. This type of infection is often called a felon; but strictly speaking, a felon is a suppuration in the tendon sheath. The treatment is prompt incision to release the pus. Even though pus is not formed, incision will relieve the pressure, and prevent infection of the deeper tissues. If not properly relieved, it may go deeper, causing destruction of the small bone at the end of the finger, and may extend into the tendon sheath, causing a felon; or it may extend up into the hand, causing cellulitis or possibly blood poisoning. The site of infection will determine the point of incision.

FELON

Felon, or whitlow, is suppuration in the tendon sheath, generally carried in by a pin prick or a thorn or a sliver. One may not always be able to determine whether the pus is in the tendon sheath or merely in the subcutaneous tissue. This is not absolutely necessary. The treatment is much the same in both cases.

Symptoms: The symptoms are swelling of the fingers, severe throbbing pain, and extreme tenderness.

Treatment: The treatment is in most cases surgical, and should be prompt, to evacuate the pus and relieve tension. If the tension is not relieved properly, there may result a sloughing of tendon and a consequent deformed finger; or if the infection extends to the bone, it may result in the destruction of the bone. Again, as an infection, it may extend to the hand, and result in general septicæmia. Not every felon need be cut to the bone. Ordinarily it is advisable to administer a general anæsthetic, thus giving opportunity for careful incision.

INFECTIONS OF JOINTS OF THE HAND

Causes: Infection of the joints, or of the membrane around the joints, is usually due to a puncture wound, or to direct extension from other infective wounds.

Symptoms: Prominent symptoms are pain and swelling. The swelling is limited chiefly to the joint. Suppuration may take place.

Treatment: This condition should be relieved promptly by incision, because of the danger of destruction of cartilage and bone, which may result in stiffness of the joint, or a complete loss of one of the small bones in the hands. The part should be placed absolutely at rest by means of a splint, for at least two weeks. One may ultimately have a movable joint; but even with the best of care, stiffness of the joint may result. Employ hot applications daily, and as soon as swelling has been relieved, give gentle massage, with bending of the joint.

Venereal Infections

ALARMING PREVALENCE

Because of false modesty in dealing with some of the worst maladies known to humanity, two diseases arising largely from illicit sexual relations have been allowed to work destruction upon vast numbers of the human race. These diseases have for centuries been held unmentionable in so-called good society. Many people do not even know them by their proper names. They are syphilis and gonorrhea. So improper has it been considered to name them, that thousands of men and tens of thousands of women have suffered long and severely of them without having been told their disease even by their physicians. So obscure were the diseases, or rather the knowledge of the diseases, that it was not known until recently what terrible ravages they had committed and were committing in the world. Not until the beginning of the war was it known how prevalent these diseases were.

Early in the war, even at the time of the physical examinations in the draft, military and naval authorities determined to expose these diseases, publish statistics revealing their prevalence, guard young men from their onslaught, and educate these young men in regard to them.

Some idea of the prevalence of these diseases may be gained from statistics put out by our government in its fight against them. It is there stated that fifty per cent to sixty per cent of all men have had venereal disease. Twelve per cent to thirteen per cent of the young men drafted were affected by these maladies. It was ascertained that in civil life, these diseases were five times as prevalent as in army life. Almost all the cases of infection in military life occurred where camp life touched the civil community.

So abundant has been the literature published and distributed and the stereopticon and moving picture exhibits and the general educational campaign prosecuted by the government, that everybody now should be enlightened in reference to these black plagues of society.

In the discussion of venereal diseases, the effort will here be to describe each briefly, in order that the first symptoms may be detected; give their progress, complications, and course; and indicate in general the treatment. None of these diseases should be treated independently of a physician. They are among the

conditions where the services of a reliable, conscientious physician are most needed. The after effects of any one of them are so terrible and so far-reaching that no effort or time or expense must be spared to combat them as effectually as possible, early in the disease. We shall now enter upon a consideration of the diseases separately.

SYPHILIS (LUES, POX, BLOOD DISEASE)

From certain descriptions in the Bible and ancient history, it has been thought by some that syphilis was known before the Christian era. Probably, though, the disease was contracted from the natives of the West Indies by the crew accompanying Columbus while he was cruising among those islands. It has been remarked that these men set out to civilize a new world, but returned to syphilize the old. At any rate, syphilis overran Europe in a veritable plague soon after the return of the men who accompanied the great explorer. It obtained its name from one of the first men who was affected by it. His name was Syphilus—hence the name of the disease.

Cause: Like most other contagious and infectious diseases, syphilis is caused by a specific germ—*spirochata pallida*. Because of its peculiarities, this germ evaded detection for many years after other germs of disease had been observed. Not until the year 1905 was it discovered. Then, by a special staining process, it was seen to be corkscrew shaped, many times larger than a typhoid germ. To contract the disease, a person must get the germ from a living source. The germ must obtain access to the blood or tissues of the body through a break in the skin, or be inherited. It cannot enter the body through an intact skin or mucous membrane. (See color plate, page 20.)

Probably more than three fourths of all cases of syphilis are contracted during sexual relations. A few cases are infected by using silverware, dishes, towels, washbowls, and seats recently infected. Even in such a case, the moist, living germ must come into contact with a raw surface and get into the circulation before it can produce the disease. Drying kills the germ very quickly. This is the reason why more persons do not get the disease accidentally.

The disease may be given by a mother to her unborn child. This form is called congenital syphilis. It may be transmitted through the original germ cell from either the father or the mother. This form is known as hereditary syphilis. Very few cases of the disease are found of the latter class, and comparatively few of the former class. Most cases arise from sexual

intercourse with persons who are infected; a few from kissing such persons.

Symptoms: The first sign of acquired syphilis is an ulcer known as a chancre. This is usually hard, has well defined edges, has a slightly blood-tinged, watery discharge, and is not sore nor painful. It may be conspicuous, or entirely obscured by overlapping skin or mucous membrane. It appears from ten days to three or four weeks after exposure, and lasts from a few days to several weeks. It may disappear and soon be forgotten, but ordinarily leaves a scar. The chancre is oftenest on the mucous surfaces of the genital organs, but may be on the skin. It may be in the mouth, on the lips, or on any part that has been exposed in a raw state. Doctors and surgeons sometimes contract the disease from the prick of a needle or a scratch when operating on a person who has the disease. This is the first stage.

From a few weeks to a few months after the first sore, there is usually an eruption on the body, varying from a few red, pointed blemishes to a general crop of pimplelike blotches. At this stage, the germs are widely distributed throughout the body. During the chancre stage, the infection is confined largely to the ulcer. The early stage is the most promising time for treatment. This stage of eruption lasts from a few weeks to months, possibly years. This is the second, or eruptive stage. During this stage and the next, the most infectious lesions, known as mucous patches, are formed in the mouth and on other mucous surfaces of the body. From these the most of the new cases of syphilis are contracted.

The third stage occurs generally from three to twenty years after the first lesion. This is known as the gumma stage. Hard tumor masses called gummata appear in different parts of the body. They may be in the skeletal part, but very often are in the brain and the spinal cord. One of the commonest causes of organic mental and nervous diseases is syphilis. These gummata may slough away and leave large or small ulcers; they may form large tumor masses in the abdomen, the lungs, the pelvis, or other parts of the body; they may form in the bones, and thus weaken them, causing fractures. Great raw sores may cover a large part of the body, causing a frightful condition. Some one has said, "Know syphilis, and you know all diseases." This is nearly true, for its forms are legion.

After Effects: The most distressing features of syphilis come as after effects of the disease. A man in the prime of life begins to have abdominal pains, which he cannot account for. These increase in severity, resembling a girdlelike constriction

about the trunk. Excruciating pains pierce his legs and body. He soon finds that he cannot walk well in the dark. He loses control of his legs. He cannot control the discharges from the body. He becomes a helpless invalid for life, because syphilis has wrecked his nervous system. He has locomotor ataxia. Ninety-five to one hundred per cent of these cases are caused by syphilis. The unfortunate victims have a long time to repent of their early lapses from virtue, for syphilis rarely kills.

Locomotor ataxia is but one of many very serious nervous diseases that are caused by the spirochæta. Senile dementia, apoplexy, epilepsy, insanity, paralysis, and many other nervous disorders arise from syphilis. Probably the greatest devastation and most pitiable destruction of this disease is seen in the descendants of syphilitics. In no other disease is the truthfulness of the warning of the second commandment of the Decalogue,—“Visiting the iniquity of the fathers upon the children unto the third and fourth generation,”—so terribly demonstrated as in venereal diseases.

The most merciful provision of hereditary syphilis is that seventy-five per cent of the children of syphilitics die before birth, or during the first year of life. A large percentage of the remaining twenty-five per cent are idiots, epileptics, insane, and neurotic in various ways. It has been truthfully said that if the cause of syphilis were destroyed to-day, the effects of the disease would not disappear for three or four generations.

Diagnosis: This is one of the most important things in dealing with this dread disease. Syphilis must be diagnosed early if grave after effects are to be avoided. Any ulcer or persistent sore on the genital organs following illicit sexual relations must have immediate care by a competent, conscientious physician. No person should attempt to treat it himself; for interference by means of advertised remedies or corner drug store applications, may so obscure the disease germ that the real condition cannot be diagnosed, and the disease will be allowed to go on and produce the most terrible after effects.

Full instruction for diagnosis cannot be given here, but sufficient information will be furnished to enable one who may have been infected to know that proper proceedings have been carried out to ascertain whether syphilis is present or not. Do not take the word of any doctor who presumes to diagnose an ulcer in a suspicious location after questionable relations, until he has made careful microscopic examinations of scrapings from the ulcer. The ulcer must be untreated before the examination; for if treated with strong medicines, the germs may be destroyed at the surface, or be driven into the tissues, where they cannot

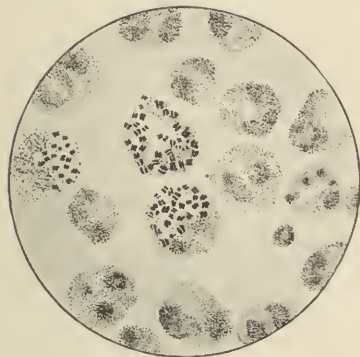
be obtained. Microscopic proceedings consist in securing superficial scrapings from the deep surface of the ulcer, and examination by two methods: first, by observing under what is known as dark ground illumination, where the living germs are seen moving about in a darkened microscopic field; and second, by staining with appropriate stains the dead germs and observing them with a microscope. Repeated tests must be made to be certain of the condition. This is the procedure for making an early diagnosis. The day is past when an intelligent, honest physician will attempt to diagnose a chancre by the feel, the induration, the punched-out appearance, or the "sanguineous discharge."

In later stages of syphilis, the test for making a diagnosis is what is known as the Wassermann test. This calls for several spoonfuls of blood to be drawn from the body and tested to ascertain whether there is any taint of the disease. It is a very delicate test, and is applicable in all suspected cases after a few weeks following infection. The test must be made by laboratory experts who are doing many each week, else it is useless. Any doctor may draw the blood and send it away, but experts in this particular work must make the test.

The most delicate test for syphilis is performed by using the Wassermann test on fluid drawn from the spinal canal, through a hollow needle. Often when the disease is not found in any other tissue or fluid, the spinal fluid gives evidence of it. The fluid must be drawn under very careful conditions and tested just as carefully as the blood is tested.

Treatment: No directions can be given for self treatment of syphilis, except suggestions for keeping the general health as robust as possible. Syphilis must be treated by a physician who understands his business and is conscientious and thorough. However, a person with this disease should observe the laws of health carefully. Plain, nourishing food in proper amounts, taken regularly and well masticated, is important. Avoid highly seasoned food, greasy foods, bad combinations, and a high protein diet. Foods made largely from grains, fruits, nuts, and vegetables, together with milk and eggs in moderation, are to be preferred to a flesh diet. Alcohol and tobacco, tea and coffee, should be avoided. Drink freely of water, principally between meals. Plenty of sleep and sufficient out-of-door exercise are essential. Frequent bathing is helpful. A hot bath for ten minutes, cooling to a little below body temperature, two or three times a week, before retiring, is advisable. Special care to keep the bowels working regularly is very necessary. Sexual excesses must be interdicted.

When it comes to specific medication, this must be directed by a capable physician, and must be kept up until the disease is fully mastered. This may take a year or more with regular injections and other medication. The drugs used are especially a preparation of arsenic known as arsphenamine (salvarsan), and neo-arsphenamine (neosalvarsan), sometimes called "606" (six-o-six). Mercury also is used, and different forms of iodides. Arsphenamine is ordinarily used by intravenous injection.



Gonococci, the Germs Causing
Gonorrhea

Mercury is used as inunctions, in pills, and in numerous other ways, according to the choice of the physician. The process is long, tedious, painful, and discouraging; but it is the only way yet known to combat the disease. A hard road to travel to expiate possibly a single lapse from chastity! Many who are not yet afflicted with the disease, are not sufficiently informed as to the agony caused by it and its treatment, to avoid any course that would bring it upon them. May the words here penned reach the eyes of many innocent

young men and women, and cause them to keep in the path of chastity, and thus avoid one of the most terrible diseases known to mankind.

GONORRHEA (CLAP)

Gonorrhea may be called a running mate with syphilis. While it is not so bold and conspicuous in its manifestations, it is much more common, and probably is more destructive than syphilis when the extent of its ravages is considered.

Gonorrhea is quite definitely traced back more than a thousand years before Christ. It has been confused with syphilis, and was for many years thought to be a symptom of that malady. Finally, when the microscope began to reveal the identity of the various disease germs, gonorrhea came in for its share of observation. It is an old, old enemy of the human race. Not until the year 1879, however, was the germ that is responsible for the disease, discovered by Neisser.

Cause: Like its boon companion, syphilis, gonorrhea is caused by a specific germ. The germ of this disease is known as gonococcus. It is one of the large class called cocci. This

group comprises such disease-producing organisms as streptococcus, the cause of blood poisoning; staphylococcus, the cause of boils and abscesses; the pneumococcus of pneumonia; and meningococcus, the germ of meningitis. Gonorrhea is a double germ, or diplococcus, each part being biscuit-shaped, and united to its fellow by its flat side, thus making a double germ. It is extremely active in invading the tissues, especially of the genital organs. As soon as infection takes place, the white cells of the blood attack the intruders by passing through the mucous membrane of the urinary passages. Many millions of these white cells are destroyed in the encounter. The gonococcus is ingested, or swallowed, by them, and may be seen with a microscope within and without these cells. The germs penetrate not only the white cells, but also the cells of the tissues, thus giving rise to inflammation, congestion, and pus, which are evidences of the disease. The activity of the germ causes it to invade rapidly the urinary and adjacent passages, producing numerous disorders of these organs.

Symptoms: Upon entering the urinary tract, the germ sets up an inflammation within from one day to a week. This inflammation is characterized by prickly sensations, soon followed by burning sensations in the outer urethra, which are increased during and soon after urination. These are followed in a few days, in men, by more or less severe pain, as the infection progresses backward into the posterior urethra and the adjacent organs. There is a discharge of pus, increasing from a thin secretion at first, to a thick, creamy pus later.

Like many other diseases, gonorrhea passes through two stages, an acute and a chronic. At first, the body puts up an active fight against the germ. If not entirely successful in overcoming the disease, it soon develops a tolerance for the germ, declares a truce, as it were, and the disease becomes chronic. The person harboring gonorrhea in this stage may have no symptoms except when he has a cold, or overexerts himself, or is intemperate in the use of liquor, or is excited sexually. In this quiescent stage, there is the greatest danger of spreading the disease by infecting others. In the acute stage, there is generally no desire for sexual gratification; but in the chronic stage, sexual desire is present, and its gratification is almost certain to infect another.

This germ, like that of syphilis, requires special staining in order that it may be seen and identified. It is seen easily after staining with methylene blue, but must be differentiated from other germs of its class by what is known as Gram stain. By this, most other cocci are made to appear black; but gonococcus is destained by this method, and must be stained again in order

to be visible. When stained by the Gram method, it is seen as flattened and double, as described, both within and without the white cells.

The manifestations of the disease are so different in the sexes, they will need to be considered separately.

In the Male. It is astonishing to know the prevalence of this disease among men. Conservative estimates by the best authorities on the subject place the percentage of men who have, or have had, gonorrhea, at from sixty per cent to seventy-five per cent of the male population. During the draft, ten per cent to thirteen per cent of those examined had gonorrhea. This percentage was reduced to five per cent or six per cent in army service.

The male urethra, being so much longer than the female, and having so many glands and passages connected with it, is subject to more severe early reaction to the disease. Anterior urethritis, or disease of the outer part of the urinary tract, soon develops into posterior urethritis by extension backward of the infection. The disease then may gain access to the bladder, the glands along the urethra, and the passages leading to the testicles. Sometimes it extends along the ureters leading to the kidneys, and may cause inflammation in any of these organs.

One of the commonest complications of gonorrhea is narrowing of the urethra, or stricture, which makes urination very distressing, and causes serious inflammation of the bladder, or cystitis. Stricture persists after the disease subsides or becomes chronic, and must be treated by dilating the urethra or by cutting the constriction. This treatment is very painful, and must be continued for many weeks to prevent later complications.

Continuing along the tracts connected with the urethra, the infection invades the seminal vesicles and the epididymis and the testicles, causing very severe complications. When the disease progresses to this extent, it becomes so firmly seated as to require months to overcome it.

In the Female. Fortunately gonorrhea is not nearly so prevalent among women as among men. It is estimated to be probably one twelfth as frequent. Five or six per cent of women have the disease, or have had it. A large percentage of these get it from their own husbands, who have contracted it before marriage and have not been entirely cured, or have been untrue to the marriage vow.

The fact that gonorrhea is not so prevalent among women as among men, is the salvation of the human race for this life. In almost every case in women, it so mutilates the reproductive

organs that conception and childbirth are impossible. A few women who have the disease have one child—no more. Half of the childless and one-child marriages are such because of gonorrhea.

It is because of the difference of anatomy in the sexes that the disease is so much more serious in women. Most of the generative organs of women are internal, while those of men are largely external. Being internal, women's organs cannot be so readily treated. Then, too, a woman does not have an equal chance to begin treatment early, for the reason that, believing her husband to be true to her, she unsuspectingly becomes infected by him. She does not apprehend any trouble, until a severe condition of leucorrhea or pain compels her to seek medical advice. By that time, the disease is fully established, and has so invaded her internal organs that no treatment short of surgery can save even her life. Here comes one of the greatest tragedies in life, but one which is enacted in thousands of households every year.

Let us picture one of these unfortunate, unsuspecting women. Do not say the picture is overdrawn, for it is not.

A beautiful young woman, the pride of her family, and leading spirit in her circle, is led by a prosperous, influential, and popular young man to the marriage altar. The charge, "Until death do you part," has been pronounced, and friends congratulate the happy pair. Everything goes well for a time. But after a few weeks, or months perhaps, the color begins to fade from the cheeks of the recent bride. Pains and distress heretofore unknown annoy her, and with other symptoms, drive her to a physician. Everything that can be done to restore her to health is done. Finally, because of her "failing health," the doctor says, "The only thing for you, madam, is to have an operation."

He does not dare tell her what is the matter. He may not even dare tell the husband, who is responsible for the catastrophe, that he has given to his young wife a disease which has brought all this upon her. The day comes for the operation. The pale young wife, in her white robe, is wheeled by white-gowned nurses quietly to the operating room. At the last moment, before the anæsthetic is administered, the trusting invalid asks her physician, "What is to be done?" He tells her in a few guarded words a little that must be done. She says to him, "Whatever you do, doctor, leave me so I can have a baby." The doctor says, "Yes, I will do my best." And he does the best he can; but the organs are so terribly mutilated by the disease, that in order to save the life of the victim, her organs by which she should perpetuate her race, must be sacrificed. The deed is

done; the patient is nursed back to life, an unsexed, undone woman. Still she does not know the reason for the tragedy. Still the physician must keep his ghastly secret from her, from her guilty husband, and from her family.

What is the cause for this calamity?—Gonorrhea, transmitted to her by a man who has been untrue either before or after marriage, or both. But you say such cases are rare. Not a bit of it! Any doctor of any experience can tell you of dozens of cases of this kind. In fact, one of the great specialties in medicine—gynecology—is built upon the ruins wrought by gonorrhea. Fully seventy-five per cent of the abdominal surgery on women, we are told upon good authority, is made necessary by this disease. But in these cases, it is seldom that the innocent woman brought under the surgeon's knife is told what the reason for her misery and her mutilation is. She is led to believe it is the lot of woman to suffer such things. Why this secrecy—this imposture?—Because the truth, if told, would reveal the hidden life of an untrue husband. If the physician should reveal the true state of affairs, he would be prosecuted for libel, and the law would sustain the primary offender as against the physician. Can anyone tell why the light of medical science should not be thrown upon this, the greatest menace to society, to women's happiness, and to posterity? Why should not physicians be encouraged and upheld in exposing such travesties? Let there be light on this dark maelstrom in life!

In Children. One of the most frequent results of gonorrhea in children is what is known as ophthalmia neonatorum, or sore eyes of the newborn. This is caused by the disease getting into the eyes as the infant passes through an infected birth canal. So usual is infection of this kind, that failure on the part of a physician to treat every newborn child so as to prevent this disease, is regarded as a crime. The result of untreated gonococcus infection in the infant is blindness in almost every case. Half of the blindness in children is traceable to gonorrhea of the eyes, contracted at birth. Go to the blind ward of the children's hospital or the orphanage, and see the little inmates groping their way about, and half of them would tell you, if they knew the real cause of their calamity, that it was a penalty they paid for the follies of their fathers. How long, think you, should this heinous crime be covered up, winked at, and excused? Let us make the greatest effort of our civilization to blot out this evil of venereal disease.

Gonorrhea is a common disease of little girls. They seem to be especially susceptible to the contagion. Either by sleeping with infected parents, or by being infected at birth, many little

girls contract vaginitis, a very distressing, destructive, and highly contagious form of gonorrhea. Many children in orphanages are affected with this disease.

Other Manifestations: A very common form of gonorrheal infection is what is known to physicians as gonorrheal arthritis. It is ordinarily called arthritis, or rheumatism. This is one instance where the term "rheumatism" covers a multitude of sins. This form of gonorrhea probably occurs oftener in men — where it should occur. Men very seldom suffer from gonorrhea unjustly; women and children almost always are innocent and unsuspecting victims. Little sympathy is due a man who has brought upon himself such diseases by willful persistence in sinful practices.

Gonorrhea, while local in its early manifestation, may become a general infection by getting into the blood. As a blood disease, it gains access to the joints, causing arthritis; invades the heart valves, causing valvular lesions of the heart; or it may produce hardening of the arteries, thus contributing to arteriosclerosis and high blood pressure, and incidentally to apoplexy and various nervous disorders.

How could Nature protest more loudly against the breaking of the law of God which says, "Thou shalt not commit adultery," than she has done in permitting the multitude of most frightful diseases attributable to syphilis and gonorrhea?

Treatment: In gonorrhea, as in syphilis, the treatment and care of the case should be in the hands of a competent physician. True, there are prescriptions that are intended to be applied immediately after exposure, which can be kept on hand if a man contemplates exposing himself to the disease. These prescriptions can be obtained elsewhere than from physicians, but such a course is reprehensible. Many men will run the risk of contracting the worst conditions imaginable in order to gratify their desires, but medical science has not put a premium on vice by making escape from its consequences easy.

Gonorrhea in the early stage can be cured in a comparatively short time if in proper hands. For this reason, one who notices any smarting or burning or any discharge from the urethra after improper sexual relations, should consult a reputable physician for diagnosis and treatment. It must be remembered that diagnoses cannot be made without careful microscopic examination, and that permanent cure has not been accomplished until microscopic examinations fail to find the germ after repeated scientific tests. Treatment and observation under a reliable physician must be continued until the man has been pronounced

entirely free from the disease for at least six months. Failure on this point is often disastrous to the man, to his wife if he has one, and, it may be, to his offspring.

The most unfortunate thing about gonorrhea, next to contracting the disease, is that women, in ninety per cent to ninety-nine per cent of the cases, have no way of knowing that they have been exposed to it. They believe their husbands to be free from vice, and attribute any discomfort or discharge to female weakness, until the disease has such a hold that great destruction is wrought before treatment can be begun and be effectual. This is the injustice—the great crime—of illicit venery.

WHAT SHALL BE DONE?

The great question for all to consider is, What are we going to do about these omnipresent diseases from the underworld? How shall we attack the monsters? In the past, these diseases have carried on their destruction unchallenged. "The word is 'mum,'" as the slang expression goes, has been the attitude toward them in the past. Even to mention the matter in any way save in medical circles, was thought to be improper. Disease usually thrives in the dark. So with these diseases. The only way to deal with them is to let the light of day on them—the light of scientific knowledge and the light of public opinion. We must educate, educate, educate. Teach sexual hygiene in the home, in the schools, and in the churches.

There are two standpoints from which to view venereal diseases: a hygienic or health standpoint, and a moral and religious standpoint. Civil health authorities as such can view the matter from a health and social standpoint only. By them, the dangers of the diseases, the methods of preventing them, and the means of treating them, are considered from an economical health viewpoint. Education along these lines is accomplishing much. Christian and other religious people must consider these diseases from a religious point of view, and emphasize the sinfulness of breaking the seventh commandment of the Decalogue, and the moral wrong, the injustice, and the misery wrought in transgressing that law. Until this is done, we cannot hope for the freedom from sexual vice which our high civilization and Christian standards demand.

MARRIAGE AND GONORRHEA

The ever important question with a man recovering from gonorrhea is, "May I marry?" Not until you know, from a careful examination and affidavit from a reputable physician, that there is no trace of infection left that will infect another. No worse calamity can come to a woman than comes through gonor-

rheal infection. Every father and mother of a marriageable daughter should demand of a man seeking her hand in marriage that he present a certificate of health from their family physician. Only in this way can they be certain of protection from this dreadful disease. After that, of course, the man must remain true to his wife.

VENEREAL DISEASES OF LESSER IMPORTANCE

There are three of these; namely, chancroid, herpes, and balanitis.

Chancroid is an ulcer resembling chancre in many ways. It is contracted in the same way; that is, through sexual intercourse. It cannot be differentiated from chancre without microscopical examination, and must be diagnosed and treated by a capable physician. Its specific germ is known as Ducrey's bacillus.

Herpes may appear on the genital organs as well as at other mucous openings of the body. It may resemble either chancre or chancroid, and calls for expert diagnosis if any exposure to venereal infection has preceded its appearance.

Balanitis is an ulcer somewhat like those just described. It causes great enlargement of the glands, usually in the region of the genitalia. These are called buboes. They may rupture and cause extensive destruction of tissue.

The important course in any of these diseases is to call for expert diagnoses to differentiate them from syphilis. Any one of them may simulate syphilis; any one of them, or gonorrhea, may accompany syphilis and may obscure it. None of them must be neglected, lest that terrible disease be overlooked, and later, during the best part of a man's life, overtake him with one of the many destructive and disabling and distressing forms of the disease.

As a last word, let us again warn against charlatans in medicine, advertising or other quacks, and against patent or corner drug store remedies. In patronizing these, one may let the opportunity pass that would make it possible to institute such treatment as would save one from a lifelong, miserable invalidism. Upon the least suspicion of venereal disease, consult a trustworthy physician, get a careful diagnosis, and follow instruction until discharged by him.

In dealing with venereal diseases, observe the following three "D's": Don't. Diagnose. Disinfect.

CHAPTER 72

Tropical Diseases

YELLOW FEVER

Yellow fever is a serious epidemic disease of the west coast of Africa and tropical America. It is transmitted by the bite of a mosquito. About two to five days after a person is bitten by an infested mosquito, there is a rapid rise of fever, with markedly congested face, and severe pains of head and back. Jaundice develops later, with hemorrhages underneath the skin and the mucous membrane of the gastrointestinal tract.

Cause: See chapter 67 for the mosquito that transmits the disease germ to man.

Symptoms: The onset of the disease is rather abrupt, with chilly sensations, and rapid rise in temperature, to about 104° F. The face is flushed and swollen, and the eyes are congested. There are severe pains in the head, both front and back, and extending down the spine. The pulse is rapid, from 110 to 125 a minute.

Vomiting, first of mucus, then of bile, comes on very early; and later in the disease, the matter ejected becomes black, like coffee grounds. The kidneys are affected, and a large amount of albumin is found in the urine by the third or fourth day. The fever remains fairly high for three or four days, being a little lower in the mornings, and higher in the evenings. A characteristic finding at this time is a slow pulse, with a high temperature.

About the fourth day, there may be a fall in temperature and an improvement in the symptoms. This, however, is soon followed by the appearance of the most characteristic features of yellow fever—jaundice and hemorrhages. The whites of the eyes first become yellow, and the jaundice rapidly spreads over the body, tingeing it lemon to orange yellow. The gums are swollen and bleed. Then appear hemorrhages from the bowels and stomach, characterized by bloody stools, and vomitus resembling black coffee grounds in appearance. There are frequently hemorrhages under the skin, showing up as black and blue spots. The patient's mind is usually clear, but he may be delirious.

Probable Outcome: In favorable cases, the temperature rapidly falls to normal, associated with a very slow pulse rate. The other symptoms then gradually disappear.

The mortality is higher in those of advancing years and those who do not have proper care. The average mortality is about twenty per cent.

Prevention: Screening the patient during the first three days of the disease prevents the infection of other mosquitoes, and thus helps to stop the spread of the disease. Measures should be used to destroy the mosquitoes, such as burying all tin cans, coconut shells, and other receptacles in which water might collect, cutting the grass and shrubbery near the dwellings, and covering all pools of water with kerosene or crude oil.

During an epidemic, everybody in the community must be quarantined. Those going out in the evenings should wear gloves and mosquito netting to protect them from mosquitoes.

Treatment: The treatment of yellow fever should be under the direction of a physician. At the onset, a saline cathartic, as Epsom salts, or sodium phosphate, should be given. (See chapter 12.) During the first three days of the disease, the patient should take no nourishment whatever. Liquids should be given in abundance, the best being water to which a half teaspoonful of baking soda to the pint has been added, or lemonade. The patient must be kept absolutely quiet. When vomiting is severe, cracked ice may be of value. If the patient cannot retain water by mouth, enemas of water containing a teaspoonful of baking soda to the pint should be given. After the third day, the patient may have milk and egg-nogs. After the fever declines, milk toast and vegetable broths may be added.

Hot foot baths, mustard foot baths, or hot hip and leg packs, together with fomentations to the spine, are of great value. (See chapter 10.) Instead of this, hot blanket packs may be given, with ice to the head. The foot bath can be repeated two or three times a day. Cool spongings are important means of keeping down fever.

MALTA FEVER

Malta fever is known also as Mediterranean fever, undulating fever, *melitensis*, and slow fever.

It is a slowly developing, typhoidlike fever, due to the presence of the specific germ *micrococcus melitensis* in the blood, and in certain organs, especially the spleen. It runs a protracted course, averaging from three to four months to a year, but has a mortality of only two per cent.

The disease is spread chiefly by the milk of infected goats, and can best be prevented by boiling the milk.

In ten to twelve days after infection, the fever slowly ascends to 104° or 105° , and gradually falls to normal after about two weeks, then, after a few days' normal temperature, rises again. Often there are two or three or even ten recurrences of fever. The patient becomes anæmic, and frequently has sudden swelling of various joints, which generally disappears after a few hours. Neurasthenic and neuralgic pains are common.

Geographical Distribution. This was formerly considered as a disease of the cities of the Mediterranean basin, but it is now known to exist in Africa, India, China, North and South America, and the West Indies. For the last twenty years, it has existed in Texas and New Mexico under the names of slow fever and mountain fever.

Cause: The causative organism, *micrococcus melitensis*, may be obtained from goat's milk, or from butter and cheese. Horses, cows, and mules, as well as goats, are susceptible.

Symptoms: About ten to fifteen days after using infected goat's milk, the patient develops headache, loss of appetite, indisposition, and steplike rise of fever from day to day. In most cases, there is constipation, and in many, a mild bronchitis, with coughing. There may be profuse night sweats, which, together with the bronchitis, may suggest tuberculosis.

After ten to fifteen days of fever, there follows a period without fever, which soon is followed by a second or third period or several periods of fever. The patient gradually becomes anæmic, and the heart gets weaker, causing palpitation, and rapid, irregular pulse.

During the course of the fever, there will be times when the joints suddenly become swollen and painful, but without redness. This condition, as a rule, disappears after three or four days.

Insomnia, neurasthenia, and neuralgic pains, especially of the sciatic nerve, are the commonest of the nervous manifestations. The kidneys are almost always somewhat affected, and albumin is present in the urine. The usual course of the disease is three or four months, but may last almost a year.

Probable Outcome: Ordinarily the death rate is about two per cent; but in certain epidemics, it has been much higher—about ten per cent. Because of the long course, neurasthenia, susceptibility to neuralgia, and heart weakness, formation of the morphine habit may result from the disease.

Prevention and Treatment: As the germs are present in the stool and the urine, these should be disinfected. The boiling

of goat's milk before using should be practiced as a preventive measure. Milk, eggs, buttermilk, soups, and fruit should be the main articles of diet. For the high fever, the best remedies are cool sponging, wet sheet packs, cool enemas (see chapter 10), together with free drinking of water or lemonade; for the joint pains, fomentations, massage, and application of equal parts of camphorated oil and oil of eucalyptus. For constipation, enemas are useful, as they at the same time lower the body temperature. The water should be about 90° F. Laxatives, as cascara or phenolphthalein, may be given at night.

DENGUE

Dengue, known also as breakbone fever or dandy fever (derived from the Spanish, *denguero*), is an epidemic disease transmitted by the *Culex* mosquito. It is characterized by a primary three or four day rise in temperature of very sudden onset, a remission about the fourth day, and a final rise for two or three days.

Backache and joint pains, together with marked soreness back of the eyeballs, are important symptoms. At the same time, there appears a rash on the extremities, spreading to the trunk.

Geographical Distribution. Dengue may appear in epidemic form in almost any tropical country, but is especially noted in the West Indies and in the countries about the China Sea.

Cause: The specific germ causative of the disease is not known, but it is transmitted to man by the bite of the common mosquito, *Culex fatigans*. (See chapter 67.)

Symptoms: The symptoms appear about two to five days after the bite of the mosquito. The onset is very abrupt, the fever rising from 102° to 105° F. The face becomes congested, and there is marked soreness in the eyeballs. Severe pains are experienced in the back of the head and in the joints. The pulse is at first increased, but later falls to about 50 beats a minute. The patient is usually nervous and depressed, and sleep is often disturbed by unpleasant dreams.

Weakness, loss of appetite, and constipation are noted at first. About the third or fourth day, the temperature drops to normal, and remains down for one to three days. During this time, the patient feels much better and regains his courage. The temperature again rises, and pains and the mental depression reappear. This second recurrence of symptoms is of shorter duration; and during this period, a fine eruption appears on the skin of the hands and the legs, spreading up to the body. The rash resembles that of measles. The symptoms now disappear and there is profuse sweating, or may be diarrhea or nosebleed.

Convalescence is likely to be prolonged, the patient being depressed and somewhat neurasthenic.

Prevention: The important factors in the prevention are, destruction of the mosquitoes, and protection from their bite. The same principles hold that are given under "Yellow Fever," at the beginning of this chapter.

Treatment: Rest in bed, a light diet, plenty of water to drink, the bowels being kept open by laxative or by enemas. For the fever, cold sponging and cool enemas are sufficient. Fomentations and hot packs are of great value for the severe pains. Aspirin in 10 or 15 grain doses every four or six hours may be given if the pain is very severe.

During convalescence, tonic treatments are indicated, as cold mitten friction, cold towel rubs, salt glows, and ice packs. (Chapter 10.) In some cases where the patient has been in the tropics for several years, especially if he is a native of a temperate zone, it may be necessary to return to a colder climate for a time, in order to regain health properly. Although there is no mortality in dengue fever, yet it has a tendency to lessen the resistance and lower the vitality, and leave the patient in a rather nervous state.

FILARIASIS

The term "filariasis" is applied to conditions where filarial worms live in various parts of the body. These worms may or may not give rise to disease conditions. Among the important species are:

1. *Filaria Bancrofti*. This worm is transmitted to man by the bite of a mosquito. The young forms that are thus transmitted to man develop into adult worms, which become two or three inches long, and block up lymphatic vessels, causing enlargement of the parts involved, usually the legs or the genital organs — elephantiasis.

2. *Filaria Loa*. The adult worm wanders about underneath the skin, especially around the eyes, and causes swellings (called calabar swellings), irregular fever, and creeping sensation under the skin.

3. *Filaria Medinensis*, or *Guinea Worm*. The adult worm is about twenty-four inches long, and about one twelfth of an inch in diameter, and lives coiled up under the skin of the leg. There is at first pain and swelling, and a blister forms, which ruptures when it comes in contact with water; and through a small opening in the center of this, the female ejects her young. Abscesses frequently develop around the worm; and if these are incised, the long, threadlike worm may be seen.

Treatment: The treatment consists in slowly extracting the worm by winding little by little each day for several days, or by injecting chloroform or 1-1,000 solution of bichloride of mercury into the worm.

ELEPHANTIASIS

This disease is found in most tropical climates, particularly the West Indies, Arabia, India, China, the west coast of Africa, Australia, certain localities of North and South America, and some of the Pacific islands, especially Fiji and Samoa.

Not every person that has the filarial embryos in the blood shows symptoms of the disease. A peculiar characteristic of this disease is that the embryos (young larval forms) frequently do not come out into the general blood stream except at night; so if the patient is bitten by the mosquito, these larvæ are taken into the mosquito's stomach, undergoing certain changes, and then may be transmitted to another person bitten by this mosquito. (See chapter 67.) These larvæ, upon entering the human being, pass through the blood stream to the lymph channels, and there they develop, and give off numerous young. By their presence in the lymph vessels, they obstruct the return flow of the lymph, thus causing the part affected, usually the legs or the genital organs, to swell and become increased in size. In some instances, the limb attains enormous size, making walking impossible.



Elephantiasis of the Left Leg

Symptoms: The symptoms are usually slow in developing, and extend over a period of several years. At first, there may be recurring attacks of pain and swelling in the glands in the groin, and red streaks up the leg, due to inflammation of the lymphatic vessels. Associated with this there will be a sudden rise of body temperature, and chills. Because of the pain and redness of the leg or the scrotum, together with the fever, this disease may be confused with erysipelas.

Bloody urine alternating with milk-white urine (chylous urine) is also noted at frequent intervals. This may last a few days, and clear up again. After several attacks of fever, pain, swelling, and bloody and chylous urine, there will be a gradual swelling of certain parts, usually the leg and the scrotum or the penis in the male, or the leg, the vulva, or the breasts in the female. The glands in the groin become large and varicose; and at times, abscesses may form around adult worms that have died. The skin is rough and thickened, and the hair scanty. The condition runs a very chronic course, and parts affected reach immense sizes, weighing from thirty to one hundred pounds.

Prevention: The things to consider in preventing the spread of the disease are: (1) Destruction of the mosquitoes and their breeding places; (2) Wearing of nets and proper clothing as protection from being bitten by the mosquito, by persons who are not infected, as well as those who have the disease.

Treatment: The treatment consists in the use of hot applications, elevating the parts involved, massage, and bandaging. During the acute inflammation and fever, hot and cold applications, together with elevation, will afford relief; and after this subsides, massage upward will help decrease the size of the part involved. However, after the part has attained considerable size, a surgeon can perform an operation and remove much of the enlarged tissue.

YAWS (FRAMBÆSIA)

Yaws is a disease of the tropics, much resembling syphilis. It is characterized symptomatically by the appearance of a small elevated area at the site of inoculation, which breaks down, forming a small ulcer. Together with this, there are fever, joint pains, headaches, and digestive disturbances. About six weeks to three months later, a generalized eruption appears over the body, resembling the primary nodule of syphilis, with a recurrence of the fever and the bodily pains.

Geographical Distribution. It is found frequently in equatorial Africa, the West Indies, tropical America, the Malay Peninsula, Siam, the East Indies, and the Philippines.

Cause: The specific cause is a minute cork-screw-shaped organism, the *treponema pertenue*, which closely resembles the organism of syphilis. The symptoms are somewhat similar in the two diseases. However, yaws is not a venereal disease. It is quite prevalent in children. It is transmitted by contact infection. Flies also are important factors in the transmission of the disease, transferring the secretions from sores of patients to abrasions or ulcers on the skin of healthy persons.

Symptoms: The disease is divided into three stages.

Primary Stage. In about three weeks after inoculation, there develop pains in the joints, nightly headaches, digestive trouble, irregular fever, and a small papule, or two or three papules together. This elevated area, which enlarges to the size of a pea, forms a soft crust on an irregular base. At this time, there is glandular enlargement, and the eruption appears. This primary sore is not found on the genital organs.

Secondary Stage. Within six to twelve weeks after the appearance of the first nodule, which may have dried up and left only a scar, or which may be still present, there again begin joint pains, headache, irregular fever, and weakness. The eruption in this stage resembles the primary swelling, but it is scattered over the body, usually in the regions of the juncture of mucous membrane and skin, as about the nose, the mouth, and the anus. It may appear also on neck, arms, legs, and buttocks, but seldom on the trunk or the scalp. There is very little or no pain connected with these sores, unless they appear in the palms of the hands or on the soles of the feet. The secondary stage lasts from two months to three years, the tubercles coming out in successive "crops" in long-standing cases.

The Tertiary Stage. The condition called gangosa, in which there is a destruction of the nose, leaving a big hole extending back to the pharynx, is considered as the tertiary stage of yaws.

Prevention: Flies that feed upon the sores of infected patients are important carriers of the disease; so patients should keep ulcers well covered, and flies should be killed. Exchanging articles of food or other substances by children is a frequent means of transmission.

Treatment: The fact that the Wassermann reaction of the blood (see chapter 71) is strongly positive in yaws as well as in syphilis, makes it essential that diagnosis be made by other means, in order to rule out syphilis. Yaws also responds to the administration of salvarsan even better than syphilis. This is only to be administered by a physician.

For local treatment, use antiseptic dusting powders, such as boric acid or iodoform.

MADURA FOOT (MYCETOMA)

Madura foot is a condition prevalent in certain parts of India, especially about Madura, in which there is a fungus infection, usually of the foot, characterized by the formation of numerous

nodules and openings, associated with destruction of the bone, and a watery discharge containing numerous granules. These granules are clumps of the ray fungus, which is the specific germ causing the disease.

Geographical Distribution. Because of the prevalence of the disease in Madura, it has acquired the name "Madura foot." It occurs also rather widespread in Africa, and cases are reported from the West Indies, Central and South America, Mexico, and in the southern part of the United States.

Cause: The disease is caused by the penetration of certain fungi into the tissue of the foot. These fungi develop in nodular areas, from which sinuses lead to the surface of the foot, in the discharges from which are found small granules, or clumps of the ray fungi. The way the disease is transmitted to man is not definitely known; but it is thought that the fungi are on thorns or other puncturing objects, which introduce the germs into the feet of those who go barefooted.

Symptoms: The disease generally begins in the sole of the foot, with the formation of swellings about one half inch in diameter. These soften and break down, and discharge a thin fluid, which has various colored granules floating in it. Nodules continue to form and break down, until the foot has become greatly enlarged and loses its normal shape, the sole of the foot appearing rounded and elevated. The foot is much thickened and puffed up, and is studded with broken-down nodules.

As the disease advances, there is destruction of the bones of the foot, and small fragments of bone may be found in the discharge. The muscles of the leg waste away from lack of use.

There is comparatively little pain or fever. The patient, however, becomes anæmic and weakened, and if not properly treated, will die of exhaustion in ten to fifteen years. The infection never spreads to the internal organs, but remains localized in the limb involved.

Probable Outcome: The cause of death usually is exhaustion, as the wounds do not tend to heal of themselves. If the limb is removed by amputation, the patient will recover.

Prevention: The wearing of shoes in the fields and the meadows is the best means of prevention.

Treatment: There is no drug that is of any value in the treatment. If begun early, thorough scraping of the wound may be sufficient. For advanced cases, amputation of the limb is the only recourse. The wounds should be kept covered with clean dressings, in cases where there is much pus present.

RELAPSING FEVER

Relapsing fever is found in Europe, Asia, Africa, and North, Central, and South America. The type found in North America is a little different from that found in Europe and Asia. It is one of the oldest of the recognized diseases. Its cause and nature were first described in 1770.

It was relapsing fever that caused the tremendous death rate in Napoleon's army during his retreat from Moscow. It was also one of the diseases most prevalent in the Crimean War. It is an acute infectious disease caused by microorganisms—spirochaetes—transmitted to human beings by bedbugs and lice. The disease is of a very sudden onset, with an equally sudden subsidence, and is characterized by frequent attacks. One attack seems to insure the patient against future attacks by the same type of parasite, but there are some four distinct types that have been discovered in various epidemics of this disease. These parasites are most commonly admitted into the blood through the bite of ticks, bedbugs, and body lice. The spirochaetes multiply by longitudinal and transverse fission. It has been demonstrated that the mother can transmit the disease to the fetus. There are cases on record in which the fetus has died of relapsing fever before birth. The symptoms of the disease follow infection by the parasite in from two to ten days.

Symptoms: The patient is suddenly stricken down by chills, severe headache just above the eyes, and pains in the back and over the stomach, with obstinate constipation. The fever ranges from 103° to 104° , and the pulse from 110 to 120. There may be also nausea and vomiting. The skin becomes yellowish, and has a hot, moist feeling.

In some cases, there is a rose-colored macular eruption (an eruption appearing in minute spots) on the thorax, the abdomen, and the legs, which remains for one or two days. Generally the temperature continues for from four to eight days. There is intense thirst, often with nausea and vomiting.

Examination shows an enlargement of the spleen and the liver. The diagnosis may be established by discovery of the spirochaetes in the blood from the blood vessels of the skin. There is very little stupor, but some delirium is quite common. When the crisis of the disease is reached, there is usually violent perspiration, and fall of temperature and of pulse rate, followed by a deep sleep and a rapid recuperation. In old people, the crisis may prove to be fatal. However, it is not considered a fatal disease if unattended by complication. Relapses often occur, but each succeeding relapse is of a milder

type. The most frequent complications are those of bronchitis and pneumonia.

The diseases with which relapsing fever may be confused are malaria, typhoid, typhus, and yellow fever. These diseases have very positive signs; and if they are excluded, relapsing fever may be diagnosed by the finding of spirochaetes in the blood.



A leper colony in the Philippines. It is to be hoped that the new treatment for leprosy will remove the necessity for such districts.

Another symptom is scanty urine. The mortality rate is about four per cent. With good care and treatment, especially in hospital cases, there is almost no mortality.

Treatment: Since this disease is caused by a definite organism, the first objective in the treatment is to destroy the spirochaetes. This is best done by the intravenous or intramuscular injection of salvarsan or neosalvarsan, which is practically a specific for the disease. The first injection should not be more than three tenths of a gram. The rheumatic pain may be relieved by a hot pack with cold to the head. If the pain is unbearable, and cannot be relieved by ordinary soothing ointment and hot applications, then the sedatives used for pain in general are to be employed, and prescription given by a physician. Keep elimination active through the skin and the bowels. Laxatives and enemas should be prescribed. The temperature can be controlled by cool sponging. In the interval between attacks, there should be at least two treatments a day, with alternate heat and cold over stomach, liver, and spleen.

Care should be taken to keep up the nutrition of the patient, feeding him during the fever, and seeking to build him up between the attacks. No serums have proved to be of special value in the attacks. It is impossible to prevent the liability of contamination of others without using some means of cleaning up the clothing and premises of the afflicted. The use of disinfectants should be encouraged. Doctors, nurses, hospital attend-

ants, and laundry employees are often very susceptible to this disease. Wooden bedsteads should be done away with, as it is not possible to disinfect them thoroughly and free them from vermin.

LEPROSY

Leprosy is a chronic infectious disease caused by Hansen's bacillus. The characteristics are, lesions of the skin, the mucous membrane, and the nerves. Perhaps the majority of the diseases now existing have existed for centuries and millenniums; but we have records of leprosy that existed as far back as the days of Moses. In the Biblical instruction to the children of Israel, there are laws pertaining to the isolation of lepers.

In the thirteenth century, lepers were isolated in Europe. They were compelled to wear a special dress, to use clappers when on the roads, and to point with a stick to articles in the market which they wished to buy. They were forbidden to drink at the public fountains, or eat with other people. They were pronounced hopeless cases at the time they were diagnosed as lepers. This disease has been carried from one country to another; and its immediate cause was unknown until Hansen, in 1871, discovered the bacillus. The exact method of infection from one individual to another is not definitely known.

Leprosy is very common in Asia, Australia, and the Hawaiian Islands; and it exists in the United States, Central America, Colombia, Brazil, and Africa at the present time. In 1891, a census taken in India showed that there was one leper to every 2,000 inhabitants, and that in that country alone there were over 100,000 lepers. The number of lepers in modern civilized countries is only a few score, probably on account of the very rigid quarantine laws.

The Germ of Leprosy. Lepreæ bacillus resembles the tubercular germ in size, shape, and appearance. (See color plate, page 21.) It is oftenest found in tears, sputum, and nasal, urethral, and vaginal secretions; and it has been detected after death in the liver, the spleen, and other internal organs. Outside the body, it has been found in earth, dust, air, and also in water and food. Other animals seem to be free from it, with the exception of apes, which have been inoculated with this disease.

The sources of infection are believed to be contaminated air or soil, drinking water, leafy vegetables, the bite of insects, and certain animal bites. It is not unlikely that some persons are infected through food, especially fish and fowl. Leprosy is believed to be contagious, as there are instances where one who slept with a leper acquired leprosy, from which he died. "Benson, an Irishman, acquired leprosy in the West Indies, and

returned to Ireland. He died from it in eleven months. His brother had lived and slept with him, and later wore his clothes; in four years he too was a typical leper. He had never been out of the British Isles.”—*“Essentials of Tropical Medicine.”*

The very rapid spread of leprosy in certain islands would further demonstrate the contagious character of the disease. About ten per cent of the children of lepers acquire leprosy. It does not seem to be transmitted by heredity, as there has never been an instance in which a newborn infant of a leprous mother or father has shown any signs of the disease.

Leprous individuals are loaded with the bacilli of leprosy, and it is most likely contracted through mucous membranes, being conveyed through the lymphatic vessels and by the blood stream.

Symptoms: This is a disease of very gradual onset. From two to three years may elapse from the time of exposure until it begins to show definite symptoms, and then it runs a very chronic course. In lands where the disease is raging, and isolation is not compulsory, the age from ten to thirteen has seemed to be the most susceptible. People over forty rarely ever succumb to the leprosy germ. It is the child of the home that becomes infected with leprosy, and later the parent.

Any unnatural patch on the surface of the skin, in countries where leprosy exists, should be a warning of the possible approach of this disease. The symptoms are nosebleed, headache, and occurrences of fever. Certain areas of the body lose sensitiveness (become anæsthetic); and at the outset, the lesions are localized, without any accountable cause. These mild symptoms may go on for years. The skin and the nerve trunks are early marked by the disease.

There are two or three well defined varieties. One is of the tubercular variety, in which there is a general rash all over the body. Coincident with a rather severe fever, a rash of a macular type occurs on the face and the legs. This will either subside or develop into nodules called tubercles. The lymph nodes show generalized enlargement. The tubercles, mostly on the face, soon alter the appearance of the patient. These little nodules are of dirty pink or brown color, and about the size of split peas. They cause the beard and the eyebrows to drop out. The tendency of these nodules is to break down and ulcerate, sometimes destroying the ears, and at other times, the nose; sometimes laying bare the bones of the skull, and making large openings through the cheek into the mouth. At times, the mastication of food is almost impossible, and swallowing difficult. Where the larynx is involved, the voice becomes hoarse, or may be lost entirely. The respiration is greatly interfered with, the gums sometimes ulcer-

ate, and the teeth fall out. The senses of smell and taste are oftentimes lost. These tubercles may appear on the extremities, which sometimes drop off and leave the bones protruding.

Another type of leprosy is the anæsthetic variety, in which the nerve trunks are mostly involved, and there is pain and irritation at first, which later subsides. In these cases, there is an eruption ranging in size from that of a dollar to that of the hand. The hair frequently falls out. Oftener the nerves are paralyzed, with foot-drop, and there is an inability to move the forearm or to walk. The waste of muscles supplied by these nerves, and an absorption of the tissues, even to the dissolving of the bony tissue, is not uncommon.

In either type, a cure is exceptional. But there are periods when the disease seems to subside. The usual duration is from two to ten years in tubercular or mixed types, while in the anæsthetic, it is from five to twenty years. Oftentimes lepers die of some other disease, only a few living until they succumb to the wasting of the leprosy itself. Some patients go on to a surprising condition of wasting, which affects the head and the extremities of the body, and live in this condition for years.

Treatment: Chaulmoogra oil and various of its derivatives have been used the past few years with encouraging results. This drug is derived from the seeds of a tree found in Assam and Burma and is thought to attack and destroy the bacilli of leprosy. As far as is known, the body is unable to develop a fighting resistance against the bacillus of leprosy, and consequently the physiological therapy that is so efficient in the treatment of other diseases has been of no avail against this dread malady. A specific drug, therefore, seems to be the only hope, and chaulmoogra oil is apparently meeting the requirements. There is no way yet of demonstrating that those treated have been absolutely cured, for sufficient time has not yet elapsed to prove the point. Investigations, however, are thus far very gratifying, and it is confidently believed by government experts that a cure for leprosy has been found.

Tropical Diseases (Continued)

BLACK-WATER FEVER

This disease is most common in Africa and parts of India, and is also found in Italy, Russia, China, southern regions of the United States, and Central and South America. As a disease, it has been recognized only for the past few decades. It is characterized by excessive blood destruction, jaundice, black urine, scanty and suppressed urination. The exact cause of this black-water fever is not known, but it is generally believed to be a manifestation of malarial infection. By some authorities, it is thought to be due to some special organism. It is found mostly in places where malarial fever abounds.

Examination of a large number of patients having black-water fever shows that ninety-five per cent of them have malarial parasites to a marked extent in the blood. Still, it has been known to occur in people with no previous history of malaria. The condition may be brought on by quinine poisoning used in the treatment of malaria. Yet, in areas where malaria is as common as in Panama, there has never been a single case of black-water fever reported.

Symptoms: The patient, in most instances, has previously been attacked with malarial fever and taken quinine. The early symptoms are general pains, loss of appetite, restlessness, yellow tingeing of the skin and conjunctiva. This is followed by shivering, headache, nausea, pain in the back, and vomiting of green bile. The patient complains of an urgent desire to urinate. There is tenderness in the area of the spleen and the liver, which are somewhat enlarged. As times goes on, they become more affected. The temperature is about 103° or 104° , and the pulse from 100 to 120. The urine is blackish in color, and there is a burning sensation in the urethra on urination. After a time, the temperature drops, owing to the profuse perspiration, and the crisis is probably past. In severe cases, the temperature rises and vomiting increases. The disease has a high mortality. Convalescence is usually quite prolonged, especially if the case is a severe one. The urine separates in two layers upon standing. The upper layer is a clear or port-wine color; the lower, brownish gray, with hyaline casts, and also casts of the bladder and the kidneys. There may be a few red cells present. Sometimes the red blood cells are entirely absent. There is an abundance of

albumin in the urine. Symptoms of black-water fever are not unlike those of malaria.

Treatment: The principal treatments for black-water fever are hydrotherapeutic measures, absolute rest in bed, and careful nursing. Because of the seriousness of this disease, every effort should be made to support the patient during the early days of the fever. The patient ought not to be transported from one place to another. Give plenty of liquids through the mouth and by enema, and, where feasible, by intravenous injection of large quantities of normal salt solution, or of suitable alkaline solution, especially where the disease is attended with a large amount of vomiting, as many of these cases show, all through the disease, an intolerance for food or liquid. Where the stomach will bear them, it is a good plan to use mild purgatives.

Hot foot baths and warm applications over the abdomen are also helpful in inducing perspiration. Where examination of the blood shows malaria parasites present, moderate doses of quinine should be administered until these parasites disappear as noted by blood examination. Alcohol rubs and cold towel rubs are frequently borne well. Care should be exercised, in giving treatments, not to overtax the heart, already weak. The treatments should be carried out systematically, and continued until the fever has subsided, and the discoloration of the skin has cleared, and the urine is normal.

The amount of urine and its discoloration are good indications of the severity of the attack, scanty urine being recognized as indication of a very grave infection, whereas a light-colored urine and a larger amount are more favorable. Though medicines are of very little value, for stimulation of either liver or kidneys, they are sometimes given by the physician. Fluids are of very great importance, and if they cannot be borne by mouth, should be introduced by rectal injection or injected into the veins. Very great care should be exercised during the convalescence of these cases. There is a tendency toward recurrence, and therefore careful attention should be paid to drinking, eating, and moderate exercise, for a number of weeks.

BERIBERI

This disease occurs in either chronic or acute form. It sometimes occurs singly, but oftener a number of persons come down with it in a certain locality. The most prominent changes of the disease are in the nerves of the extremities, in which there is a degeneration or wasting. There is also a disturbance of digestion, swelling of the extremities, and weakness of the heart.

The disease is found for the most part in Japan, China, the Philippines, Java, and other countries to which Japanese and Chinese immigrate, but is largely confined to Asiatics. In the Straits Settlements and Malaysia, there have been reported in the last twenty years 150,000 cases, with 30,000 deaths, in the government hospital. Prior to the year 1884, nearly one third of the Japanese navy were continually disabled by beriberi. It is very common among the Mohammedans. Laborers, sailors, and prisoners are its most frequent subjects.

Causes: Beriberi is regarded as a food-deficiency disease (see chapter 23), and is most likely to occur between the ages of fifteen and thirty years, but may occur at any age. Poor hygiene, crowding, poor ventilation, and high atmospheric pressure are predisposing causes.

Food poisoning and food deficiency are evidently the most plausible explanations of the existence of this disease. Eating largely of polished rice, from which the outer layers of the grain, containing the vitamins, have been removed in the milling process, is definitely known to cause beriberi. These substances are essential for the nerve tissue; and when they are not supplied, the symptoms of beriberi are manifest. The supplying of the particular food contained in the rice husks to beriberi patients is the most effective means of recovery. Most cases improve when removed from the locality in which the epidemic occurs. However, changes in diet are the most important factor.

Symptoms: There are two very decided types of the disease from the standpoint of symptoms, either of which proves the diagnosis of beriberi:

1. The one known as the atrophic, dry, or paralytic variety, in which the onset is rather slow, with a dull headache, some palpitation of the heart, and pain in the stomach. A waxy condition develops in the skin, and a sense of heaviness in the legs, with difficulty in walking, in which the reflexes gradually disappear. After a while, there is a characteristic gait, in which the patient steps high and walks as though he were on pins and needles. There is a numbness of the limbs, a wasting of the muscles of the leg, and often of the forearm, and there may be a generalized wasting of the muscles of the body. The sense of hot and cold is diminished. The urine is lessened in quantity. The legs and the face have a tendency to swell. Fluid can be detected in the pleural sacs and the abdominal cavities. The bowels are constipated, and the temperature is subnormal rather than normal.

This condition may continue for weeks. Patients improve at times only to grow worse rapidly. The tendency is, in most

cases, to rally under proper treatment, although there may be some resulting paralysis in the extremities, and not infrequently the patient suddenly dies. The occurrence of fever always indicates complications, such as malaria or tuberculosis, in which cases the outlook is quite poor. Those having this trouble often have recurrences of it.

2. The other variety, the œdematous, is a more acute type of the disease. In this, there is a good deal of pain over the stomach, with nausea; throat congestion; rapid heart action and palpitation; difficult breathing, with a definite increase in the pulse rate. The urine diminishes, and there is early appearance of fluid in the pleural and abdominal cavities, and also about the heart. The heart becomes embarrassed, owing to the pressure of the fluid on it, as do the other organs of the chest and abdomen. Death may come on very suddenly. Most of these cases are fatal.

The disease resembles nerve paralysis that often results from mineral poisoning, such as arsenic and lead. In the tropics, the principal difficulty is to differentiate the tropical type of beriberi from another tropical condition known as epidemic dropsy.

Treatment: It is important to recognize the early symptoms of beriberi, for early treatment produces results, and a cure usually follows. The treatment consists largely in giving relief to various symptoms by rest, massage to the extremities, hot foot baths, alternate hot and cold over the stomach, *et cetera*. Keep the bowels clean by the use of castor oil or some saline laxative. Endeavor to supply all the elements necessary for human nutrition. The diet should include yeast, about a teaspoonful to a tablespoonful of which is added to boiling milk, and this is stirred up with cream to make it palatable, and taken at the close of the meal. The food most recommended for beriberi patients is as follows: soft-cooked eggs, fresh milk, beans, peas, lentils, brown bread, lemon juice, spinach, asparagus, walnuts, and the commercial vitamins. A careful diet should be maintained over a period of several days or weeks after the symptoms have cleared.

EPIDEMIC DROPSY

This is a disease found in Asia, chiefly in and about Calcutta. It lasts from three to six weeks, and is characterized by profound anemia and sudden appearance of marked swelling of the entire body. The sexes are about equally susceptible to it. The course is generally very favorable.

Symptoms: There is a noticeable burning on the soles of the feet first, after which it may affect the whole body. There may be vomiting and diarrhea. These symptoms may subside. Some fever exists, usually about 101° to 102° F. There is often an

eruption on the face or the trunk, similar to measles. This generally occurs after the whole body becomes œdematous, and disappears about a week later. The serous cavities are early filled with fluid, resulting in pressure on the lungs and signs of difficult breathing. With ordinary care, the outcome is favorable.

Treatment: Early use of saline purgatives and sweats, and means used to stimulate the kidneys, are indicated. This ought to be carried out earnestly from the beginning. The fluid may be removed from the pleural cavity as well as from around the heart. Otherwise than this, the treatment is that of careful hydrotherapy, followed by about the same routine as in beriberi, with which disease this is most frequently combined.

SPRUE

Sprue, tropical diarrhea, white diarrhea, hill diarrhea, are some of the names applied to a disease that incapacitates large numbers of Europeans and Americans who reside in the Orient.

The disease usually begins about the middle of the hottest season of the year. Those who are in poor physical condition from some previous illness, or from improper food, or from overwork, are most liable to fall a prey to the malady. Women who are below par physically on account of frequent pregnancies are very likely to get sprue.

Cause: The best light we have at present concerning the cause of sprue is that it is a fungus, resembling somewhat the molds on stale bread. This fungus is found in the stools of sprue patients.

As to just how the disease is contracted, no definite statement can yet be made; but it seems most reasonable to conclude that the infection gains entrance to the body through the food and the drink. This gives a clue to the means to be used in guarding against the disease; namely, thorough scalding of all vegetables, fruits, *et cetera*. The writer is of the opinion that bread bought from the baker may be the article most to be feared. It is known that fungi grow on ordinary soft bread very readily. Even bread that has been recently baked may contain fungi in the center of the loaf. Should fuller investigation prove that soft bread is responsible for the spread of the disease, it would then be necessary to slice all the bread and bake it the second time, thus making zwiebaek of it, before eating it.

Living in unsanitary houses, and eating tinned vegetables and other tinned products, are not causes of the disease, as some have concluded; they are simply factors that help to weaken the body and render the individual more susceptible to infection by the germs that cause the disease.

Symptoms: Sprue often starts as a chronic fermentative dyspepsia. This may continue for many weeks. Sooner or later the patient becomes incapacitated for physical or mental work. He may have one or two loose stools in the early forenoon, but gets along fairly well for the rest of the day. He notices that the stools are of a very light color and somewhat frothy. In addition to these symptoms, he has a sore mouth and tongue; but the tongue is not coated. Usually the stools are large in amount, and seem out of proportion to the quantity of food taken. In most cases, the bowels are bloated somewhat. There is no acute pain, but more or less abdominal discomfort. Loss of weight is always very noticeable.

The typical symptoms of a well developed case of sprue are as follows: The mouth and the tongue are sore. The tongue is quite clean, and looks beefy red and raw on the edges. There is a diarrhea, the stools being of a light clay color, pasty in consistency, frothy, and large in amount. Loss of strength and a progressing loss of weight are marked. There is discomfort in the abdomen from the distention caused by gas in the bowels. There is seldom any fever. The symptoms may come on during the summer, and entirely disappear later, during the cooler weather of fall and winter, only to return the next summer with greater severity. The disease is very chronic, often running for several years. At times, there may be no diarrhea, but rather more or less constipation.

Treatment: Unless the person having sprue realizes the serious nature of his disease, and is willing to undergo a long course of treatment, dietetic and otherwise, there is little hope of his regaining health.

Rest in bed is very essential when there is any evidence of sprue. No work should be undertaken. Either physical or mental work and worry will often bring on a recurrence of the severe symptoms, even after what has seemed to be a complete recovery.

Climate no doubt has a great deal to do with lowering vitality and retarding recovery; therefore the ideal thing for a sprue victim is to get out of the tropics and live in one of the temperate zones, in America, Europe, or Australia.

Diet is one of the most important parts of the treatment. Reduce, as far as possible, the quantity of starchy foods, and use proteid foods in their stead. (See chapter 20.) Milk should be taken often, and should be slowly sipped. The milk diet gives good results when carefully followed. But most patients tire of milk, and require a change of diet. For these, it is well to use

buttermilk to take the place of a part of the milk. The best form of buttermilk is that known as yogurt. This has, in our experience, proved to be the best single article of diet obtainable. As the symptoms become less severe and the appetite increases, zwieback, dry toast, butter, cream, eggnog, jellied eggs (coddled eggs), mild fruits, then *purée* of peas, *et cetera*, may be taken. There should be some green vegetable, such as spinach, included in the daily diet. A diet consisting entirely of beef is recommended by some physicians. Whatever diet is given, food should be taken in small amounts four or five times a day.

Every sprue patient shows a decided decrease in the acid of the stomach secretion. Other of the digestive glands also fail to do their work. It is therefore necessary to give about twenty drops of dilute hydrochloric acid half an hour after each meal. This should be taken in one fourth glass of water, and should be drunk through a tube, to protect the teeth. Two hours after each meal, give ten or fifteen grains of pancreatin. The use of pancreatin must be continued for a long time after all symptoms have disappeared.

Fomentations to the abdomen and the liver twice a day are markedly beneficial. The stools are very acid in reaction. It is well to give a hot soda enema daily, adding an ounce and a half of baking soda (sodium bicarbonate) to each quart of water. The temperature of the water may be 105° or over. Cold applications, aside from such mild tonic treatments as cold mitten friction or cold wet hand rubbing, are not well borne by sprue patients. We advise every sprue patient to wear a flannel band, eight or ten inches wide, about the abdomen continuously.

KALA AZAR

Kala azar, dumdum fever, and leishmaniosis, are a few of the names applied to a disease found throughout India, Burma, Indo-China, and China.

The cause is a parasite that probably gets into the body from the bite of the bedbug. The disease runs in families, several children contracting it one after another. Most of the people affected are of the poorer classes.

Symptoms: The disease is very chronic, and it cannot always be known when it does start. There is a fever of the remittent type; that is, the fever goes up, then once or twice during the twenty-four hours drops, but not down to normal. The spleen and the liver continue to enlarge. The abdomen begins to swell because of the massive spleen. The patient becomes very thin and anæmic. In this weakened condition, he is often attacked by some other disease and quickly succumbs.

The disease can only be diagnosed with certainty by an examination of the blood.

Treatment: The treatment that gives best results is the injection of a solution of tartar emetic into the veins. This requires the patient's residence in a hospital under the care of a skilled physician.

Infantile Kala Azar. Kala azar is a disease that also attacks infants. It is often mistaken for malaria. The child becomes pale, has attacks of diarrhea, irregular fever, and bleeding from the nose. The spleen eventually enlarges. A serious complication of this disease is gangrene of some part of the cheek or lips, causing a large piece to slough out. The treatment is the same as mentioned in the preceding paragraph. The child should, if possible, be taken to a temperate climate.

PLAGUE

Black death, the pest, bubonic plague, pulmonic plague, are all names that are given to the disease that is caused by the bacillus *pestis*.

The plague is a very common disease in India and the southern portion of China. It is not confined to tropical areas. A severe epidemic of plague swept over Manchuria a few years ago; and cases frequently occur in different parts of the north temperate zone, for example, such port cities as New Orleans, San Francisco, and London.

It has been absolutely proved that the bubonic form of plague is spread by fleas. (See chapter 67.)

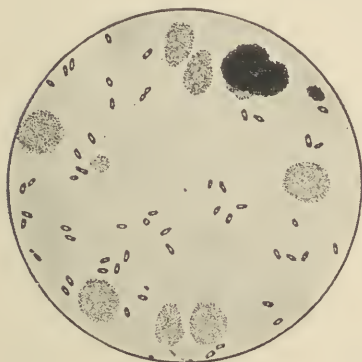
The pneumonic form of plague is one of the most contagious diseases known. It is not spread by rats, but spreads from man to man through the air. The invisible droplets that are thrown out of the mouth and the nose in coughing, sneezing, or talking, contain the plague bacillus. During epidemics, a mask of several thicknesses of fine mesh gauze must be worn over the mouth and the nose, whenever a person goes where he will be in contact with those who have the disease.

Symptoms: The incubation period of bubonic plague is from two to ten days. The disease usually begins suddenly, with a high fever, great weakness, severe headache, and pains in the back and the limbs. There may be also vomiting and diarrhea. In most cases, lumps (buboes) of varying size begin to appear during the second day, in the groin, under the arms, and in the neck. The fever may go up to 103° or 104° F. the first day. It may fall a degree or two the next day, but it generally goes up

again to the same or a higher degree than at first. There is intense thirst.

The disease causes great prostration, and death commonly takes place about the third or fourth day. In the more hopeful cases, the fever goes down very slowly, and after a long convalescence, the patient recovers.

The incubation period of the pneumonic form of plague is very short. It may be only a few hours, and seldom is longer than five days. The symptoms at the outset are very much like those of ordinary pneumonia. It starts with a chill and headache, the fever goes up rapidly, the pulse becomes very rapid, and the patient soon begins to cough and has difficulty in getting his breath. The sputum is simply mucus at first, but soon becomes bloody. The patient soon becomes delirious and dies. The death rate is very high, recovery being rare.



Germes of Bubonic Plague

Treatment: When in a district where there is much plague, it is advisable to make use of vaccination against the disease.

There is no question but that this is of great value, but the protection secured from the inoculation does not last more than a few months.

In the treatment of plague, if a reliable serum can be secured, it should be used; but it must be used only by one who has had experience in the use of such serum. The patient must be kept in bed, and the high fever must be treated with cold sponging and cool enemas. An ice bag may be put on the painful buboes. Sometimes hot applications, such as hot fomentations, give more relief than the ice bag. When a bubo suppurates (comes to a head), it should be treated the same as a common boil. Keep cold applications over the heart, and on the head also in case the patient is delirious.

Care must be taken to give a large amount of liquid, in order to keep up the action of the kidneys. Fomentations should be applied over the lower part of the back several times a day. Give a liquid diet, consisting of milk, vegetable soups, broths, *et cetera*.

There is no medicine that is of any value in the treatment of this disease.

CHOLERA

Cholera is usually called Asiatic cholera, because during the last hundred years or more, the disease has been seldom seen outside of Asia. It is not found in communities that lay any stress on sanitation, especially the sanitation that has to do with the supply of clean drinking water and clean food.

The germs of cholera are taken into the system through either food or drink. They are not carried in the air. There is therefore no danger connected with nursing a cholera patient, if the nurse will only wash the hands thoroughly before eating, and not take any food or drink that has not been freshly boiled and kept in clean dishes protected from flies. This fact is mentioned because often in a cholera epidemic people become so frightened they will not go near the sick to care for them.

Cholera is not a contagious disease, like scarlet fever. The germs always find entrance to the body by way of the mouth. If this fact is understood, one can live in a community where cholera is raging, yet avoid contracting the disease. Some of the ways in which cholera is spread are as follows: Proper care is not exercised in disposing of the bowel discharges of those who are sick of cholera, and these discharges are teeming with cholera germs, which, under the conditions ordinarily found in tropical countries, will live for several months. If the bowel discharges are thrown out without having been first boiled, or disinfected by some other method (see chapter 14), the wells, ponds, and streams in the vicinity become infected. It is also a common practice for vegetable growers in the Orient to use human excreta as fertilizer to spray over the growing vegetables. Flies, cockroaches, ants, rats, and mice are all carriers of cholera infection. They feed on filth, and carry the germs on the legs and in the discharges from the intestines. In this way, they contaminate any foodstuffs to which they gain access.

To avoid contracting cholera (and what is said of cholera applies fully to typhoid fever and the dysenteries), all who live in such countries as India and China should make it an inflexible rule to boil all water before drinking it. All dishes and cooking utensils should be scalded with boiling-hot water. Vegetables and fruits that are to be eaten raw should be first washed, then immersed in boiling water for a few seconds. Care should be taken always to wash the hands before handling food. These precautions apply to all seasons of the year. When cholera is raging in a community, the additional precautions should be taken of eating no raw food unless it is something like a banana or a green cucumber, which can be first immersed in boiling water and afterwards peeled. All cold foods should be avoided. Eat

nothing that has been exposed to flies or roaches. Eschew all cooked foods bought in the native markets. Give close supervision to the boiling of the dairy milk.

Those who are ill nourished, or who are suffering from any derangement of the digestive organs, or who use alcoholic liquors, are more liable to contract the disease than is the average healthy individual. Fatigue, loss of sleep, and too free use of cold drinks are all factors that weaken the bodily resistance to cholera.

Symptoms: The incubation period varies from a few hours to four or five days. The disease usually begins suddenly, often with severe cramps in the back or in the legs and the arms. It may begin with diarrhea and colicky pains. Shortly after the onset, the stools become thin, and contain small white, curdlike masses. These are the so-called "rice-water" stools. Generally there is severe vomiting at the outset. So much fluid is lost in the stools, that the patient complains of great thirst, the urine diminishes, the skin dries up, the face has a pinched appearance, the skin feels cold, and the lips, the face, and the finger nails become bluish. In every epidemic, there are many cases that run a very light course, and except for diarrhea, have few symptoms.

Treatment: No matter how slight the symptoms may be, the cholera patient must be put to bed and kept there. A bedpan and a urine bottle must be used. From the very outset, give large quantities of water to drink. The water may be flavored with the juice of lemons. If calcium permanganate can be secured, add from one to five grains to the pint of water, and give the patient as much as he can drink.

The patient must be kept warm. Fomentations should be applied to the abdomen every three hours; and a hot water bottle should be kept at the feet and one at the spine, if he feels the least bit chilly.

During the most acute stage, very little if any food should be given; but force the drinking of fluids, part of which may be strained vegetable or barley broths, and the liquid that is secured after straining out any solid particles from very thin rice gruel.

In some recent epidemics, powdered kaolin (a species of clay) has been used with excellent success. About three ounces by weight of finely powdered kaolin is thoroughly mixed into eight ounces of cold boiled water, and a small glassful of this mixture is given every hour or half hour. It is rarely necessary to give more than six glassfuls during the first twelve hours. During the following day, several more glassfuls are given; and in most cases, relief of the severe symptoms is secured, so that no more need be used. If the patient vomits the mixture, repeat the dose,

and even use the stomach tube if necessary. During the eighteen hours that follow the first dose, give nothing by the mouth except plain water. This same mixture in quantities of two to three quarts may be given as a high colon enema.

In all grave cases of cholera, normal saline solution should be injected into the veins. This requires the services of a skilled physician. The temperature of the injected solution, as well as the amount to be injected, is determined by the patient's condition.

Kidney complications, with a decrease or even stoppage of the production of urine, is to be feared in every case of cholera. The free drinking of water, keeping the patient warm, applying fomentations over the small of the back every three hours, and using large hot enemas (110° F.) of an ounce and a half of soda bicarbonate to the quart of water, are all useful in combating this complication.

For the prevention of cholera, vaccination against the disease is of value.

There are many people who have cholera and recover, yet continue to have the cholera germs in their stools. They are "cholera carriers." In taking into the home, either as a servant or in any other capacity, one who has had cholera, this should always be borne in mind; and if possible, have the stools examined at a reliable laboratory, to see if they contain the cholera germs.

DHOBIE ITCH (RINGWORM)

"Dhobie itch" is a name used to cover a host of skin diseases. Most of the so-called dhobie itch is ringworm. A dhobie is a laundryman in India. Clothes sent to him to be laundered are put in with a large assortment of clothes, among which may be garments worn by people who have this disease. Thus clothing becomes contaminated, and the wearer contracts the disease.

Any part of the body may be infected. The appearance varies according to the location. The disease usually starts as a small reddened area, which itches intensely. This spot increases in size, and similar spots may appear on other parts of the body. They are spread by scratching. The clothing becomes infected with the germs (vegetable parasites) that cause the disease, and this infected clothing spreads the infection to other parts of the body. All clothing that comes in contact with the skin should be washed at home unless it is washed in a steam laundry where the clothes are boiled. Ringworm of the face and scalp of adults is usually contracted in barber shops. Some barbers seldom disinfect any of their instruments, and the dirty hairbrushes and razors spread the disease from one patron to another. A thorough shampoo following a visit to the barber shop is a necessary pre-

caution. In the Orient, children sometimes contract certain forms of ringworm from a dog or a cat or a donkey.

Treatment: Ringworm of the scalp is very difficult to cure permanently. The hair of the affected spot must first be shaved off clean. Then scrub the spot well with soap and hot water, using a brush to remove all the crusts and scales. Following this, apply a twenty per cent ammoniated mercury ointment. This must be well rubbed in twice a day for several days in succession. The results obtained depend largely upon the thoroughness with which the ointment is rubbed in. In some cases that will not yield to this treatment, the spot, after being well washed and dried, should be painted with a strong solution of iodine (liniment or tincture of iodine). As soon as this dries in, paint on a small quantity of a solution made by dissolving five grains of corrosive sublimate in two ounces of water. Great care must be exercised in using this, because it is a powerful poison. See that none of it gets near the eyes. After it has been applied, the excess should be carefully wiped off. This method is painful. A second application must not be made until all the redness and pain following the first application has disappeared.

For ringworm of the face, the ammoniated mercury ointment will usually suffice. The corrosive sublimate must not be used.

There are some forms of ringworm of the scalp that can only be cured by the X ray. The X ray causes all the hair to fall out; and as the hair falls out, the disease is cured. In the course of a few weeks, the hair begins to grow in again.

Ammoniated mercury ointment will cure mild cases of ringworm of the body. Another line of treatment is to apply an ointment made of two drams of resorcin, twenty grains of salicylic acid, four ounces of vaseline, four ounces of lanolin. Another ointment that is efficacious but rather severe on the skin is a five per cent chrysarobin ointment.

For ringworm infections on the feet, especially about the toes, a five per cent solution of salicylic acid in fifty per cent alcohol is very useful. (See also chapter 51.)

BILHARZIOSIS

This is a disease occurring in some parts of Africa and Asia.

Symptoms: The characteristic symptom is bloody urine, which is caused by the eggs of a worm. The worm lives in the blood vessels, and lays its eggs in the wall of the bladder. This sets up an irritation and inflammation that result in the oozing of blood into the bladder.

Treatment: No treatment for the disease is of any special value. The bleeding is seldom very serious. In case it becomes

so, the patient must be put in the care of a specialist in diseases of the kidneys and bladder.

Quite recently the claim has been made that benefit is derived from the use of tartar emetic given in the veins. The treatment could only be given by a physician who had had experience in the treatment of similar cases.

ORIENTAL SORE

Delhi boil, Aleppo boil, Bagdad boil, are other names applied to this sore. The names indicate the localities in which the condition is frequently encountered. The infection may be transferred directly by some of the watery discharge from one of these sores getting on the skin where there is a slight scratch. Flies and possibly some species of mosquitoes are responsible for transmitting the infection.

Symptoms: At first, one or more small red spots make their appearance on the skin of an uncovered part of the body. The spot becomes larger and redder. Then it begins to ulcerate and exude a yellowish fluid. The ulcer increases in depth. There is little pain connected with it. Healing occurs very slowly.

Treatment: The treatment advised is the use of alternate hot and cold applications. If the sore is on the hand, treat as follows: Provide two small buckets, partly fill one with very hot water, fill the other with very cold water. Immerse the hand in the hot water for one minute, then plunge it into the cold water for a few seconds. Repeat the process for twenty minutes or more. Use this treatment twice or three times a day, the frequency depending on the severity of the sore. When not using the treatment, wet a piece of gauze or soft cloth in hot saturated solution of borie acid, and apply to the sore. Over the wet gauze, place a piece of oiled paper or oiled silk, to prevent drying. The sore may be washed once or twice a day with hydrogen peroxide solution.

TROPICAL ULCER (SLOUGHING PHAGEDENA)

This ulcer is usually found on the foot or the leg. It begins as a blister. This soon breaks open, and an ulcer forms, which gradually gets deeper, and may cause a sloughing of everything overlying the bone.

Treatment: The treatment outlined for Oriental sore may be used for this ulcer; but the best results come from washing the ulcer with hot borie acid solution, then spreading a thick layer of ten per cent protargol ointment on a piece of gauze or soft cloth and placing on the ulcer, afterwards bandaging firmly. Change this dressing twice a day.

Personal Hygiene in Tropical Countries

The white man's dread of the tropics is decreasing. Within comparatively recent years, modern methods of sanitation and disease control have transformed certain tropical regions, such as the Panama Canal Zone and a few localities in the Orient, and have rendered these places as healthful as the average temperate zone locality. To accomplish such happy results requires energetic action on the part of the government concerned, and an intelligent appreciation of the value of public health measures on the part of the populace. Unfortunately these conditions do not prevail in most of the tropical countries, and the result is that the health of those who dwell there is dependent upon close attention to personal hygiene. That careful attention to personal hygiene will enable one to spend years in the tropics and keep in good health is evidenced by the fact that there are many robust Europeans who have spent almost a lifetime in the tropics.

THE HOUSE

Most Europeans, upon arrival in a tropical country, have no choice in the matter of a dwelling house. They must be content with whatever they can secure. In case there is opportunity for the exercise of choice, the matter of site should receive first attention. Avoid congested native quarters. Avoid proximity to ponds and paddy (rice) fields. An elevated plot is first choice. If the plot is level, have a fill of three or four feet for the portion on which the house is to be built. The bungalow is the ideal style of house for the tropics, provided there is garden space about the building, and some elevation for the building site.

Mosquitoes are a dangerous pest, in that they are the active agents in spreading several of the most serious diseases. It is now known that they carry malaria, yellow fever, breakbone fever, and probably have a part in spreading some forms of tropical ulcer. There is but one way to be safe from them, and that is, to screen the dwelling house. Screening is no less necessary to avoid the disease-carrying flies. With flies and mosquitoes effectively shut out of the house, the greatest menaces to the health of the dweller in the tropics are removed. Screening the kitchen to keep out flies is a protective measure that it would be most hazardous to omit.

Do not have trees or other dense vegetation growing close to the house. Vine-covered walls and large overhanging trees are

beautiful to look upon, but they often make the house a veritable pesthole, because they form an ideal shelter for mosquitoes.

Garbage cans that are large enough for the daily output of garbage, and do not leak, and have covers that shut fly-tight, are an essential part of the kitchen furniture. Keeping all garbage tightly covered, and having it carted away daily, will serve to lessen greatly the number of flies, roaches, and rodents that come on the premises.

Bubonic plague is one of the diseases most feared in the tropics. It is first contracted by rats; and from the rats, it spreads to the human. For this reason, energetic measures must be followed in keeping these rodents out of the house. Every house in the tropics should be made rat proof. When obliged to live in a house already infested with rats, the best thing that can be done is to keep tightly covered everything that would serve as food for the rodents. The use of traps and poison may be found necessary.

As an emergency measure to help in getting rid of rats, it may be advisable to keep a cat on the premises; but as a general rule, it is better not to have a cat or a dog in the house. Both of these common household pets are carriers of disease. Children playing with them, often get infected with ringworm of the scalp. They are also carriers of intestinal parasites (worms). Mad dogs are allowed to run about at will, and the danger of the household pet's being bitten and becoming mad is one to be avoided. Where a cat or a dog is permitted to enter the living rooms, the occupants are sure to be plagued with fleas.

FOOD AND DRINK

In tropical countries, Europeans are troubled with diseases of the digestive tract to a greater extent than with any other class of diseases. There are several reasons for this. In the first place, many of the foods are different from those of temperate zones. There is a lack in both quantity and quality of dairy products, fats, and oils. There are very few vegetables and fruits that can be eaten raw. Many, upon arrival in the tropics, are tempted by the new and strange foods, and are led to over-indulge. On account of the heat and the high humidity, the newcomer is inclined to shirk bodily exercise, but he fails to appreciate the importance of reducing his food intake in proportion. Given a high, humid temperature, and a locality where diarrhea, dysentery, and other bowel trouble abounds among the people, it is very easy to contract one of these diseases.

It would be a very rare sight to see a Chinese drink any water that had not first been boiled. Although these people are unac-

quainted with the germ theory, yet experience has taught them that unboiled water is sure to bring on sickness. The European who neglects to make it an inflexible rule to drink no water that has not first been boiled will not spend many well days in the tropics. Practically all the wells are surface wells. The soil is very porous. The bowel discharges are scattered about promiscuously. Frequent rains and close proximity of the well to the house make the infection of the well by the bowel discharges almost an absolute certainty.

Not only must no unboiled water be drunk, but water for washing the teeth and rinsing the mouth must first be boiled.



A Boatload of Bottled Water in the Philippines

The water used in giving an enema should be boiled water. Many people use largely of the bottled waters. Even these are unreliable unless the source is known. Native tradesmen have been known to bottle up the ordinary well water without so much as heating it.

Alcoholic drinks are easily obtainable, and the consumption among Europeans is in excess of that among the natives. In a climate where the greatest care must be exercised in order to keep well, it is hardly necessary to add the admonition to avoid all alcoholic drinks.

KITCHEN AND FOOD

The sanitary condition of the kitchen should receive more attention than is usually given it. In the matter of keeping in health, the providing of a clean, well lighted, screened kitchen takes rank among the items of prime importance. As a rule, the kitchen is in a building detached from the main dwelling house. It is generally poorly lighted and poorly constructed. In most instances, the native cook and the house boy are allowed to take full control, and the result is that it becomes an unsanitary place, and a menace to everyone who eats the food that is prepared in it.

Food of all kinds should be kept in places secure from the access of flies, roaches, and rodents. Cooked food should not be kept over from one day to the next, even if it is kept in the refrigerator.

Special effort should be made to secure good dairy products. The milk from the native cows and water buffaloes may be used in case other dairy milk cannot be secured. One must always be on the alert against too free dilution of the milk supplied by the native milkman. In the season when the demand is greatest, they will sometimes resort to the expedient of adding some white coloring matter to a little milk and a large quantity of water, in order to supply the demands of their patrons. All dairy milk must be boiled before it is used. In places where dairy milk cannot be secured, tinned milk may be used. The dry milk that can be secured packed in air-tight cans is superior to the tinned milks, especially as a food for infants and children.

Green vegetables are an important item in the dietary. Some raw food, either vegetable or fruit, should be eaten daily. Very few of the vegetables raised by the native gardeners can be eaten raw, because of the methods of fertilizing used. Some vegetables—for example, cucumbers—can be peeled and eaten raw if immersed in boiling water for a few seconds before peeling. In the case of all vegetables and fruits that are to be eaten raw, the only safe rule is, first to immerse them for a few seconds in boiling water. An ideal plan that can be carried out by some is to have a plot of ground where green vegetables can be raised under one's own supervision. Any effort spent to secure a supply of vegetables and fruits that can be eaten raw will be well repaid. The tendency to use largely of tinned foods probably has a great deal to do with the weakening of resistance to many of the common digestive disorders.

Some foods to be avoided are native confectionery, native foods that are composed of numerous ingredients, native foods exposed for sale in the shops. The native foods in the shops are exposed to flies, dust, and promiscuous handling. The beginning of many a European's ill health follows closely upon the partaking of a native feast.

CLOTHING

The heat and the high humidity call for light, porous clothing. While white is worn by many, yet the opinion of several good authorities is that some color in the cloth is preferable.

To protect the head from the ill effects of the tropical sun, some form of sun helmet (topee) should be worn. There is very little question but that in tropical countries, there is some harmful effect that results from exposure to the sun, that is separate

and apart from the heating effect. Newcomers should begin wearing the sun helmet early in the season, and they should wear it whenever they go out into the sun, no matter how short the time. The sun helmet should be ventilated by having small openings at the top and on either side. It should be of such a shape as to protect the back of the neck thoroughly.

Colored glasses with large-sized lenses are a great relief to the eyes, and if worn by more people, would prevent many unexplained cases of headache. In traveling, they become a necessity.

Clothing that is worn next to the skin should not be sent to the native laundryman. The native laundries are the principal agents in spreading dhobie itch.

SLEEPING

To keep in good health in the tropics, one must have a full quota of hours for sleep. The climate and the environment are both a heavy drain on the nervous system, and keeping late hours is certain to bring on a condition of nerve fag or nervous breakdown. In the past, the ill health of

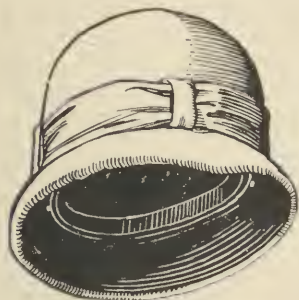
a very large percentage of those invalided home from the tropics has been on account of some condition connected with the nervous system.

For the greatest comfort during the hottest weather, a fairly solid mattress is best. One of the thin rice straw mats placed on the mattress under the sheet makes a far cooler bed to sleep on than the ordinary mattress.

No matter how thoroughly the house may be screened, it is still advisable, and in most cases necessary, to sleep under a mosquito net. The net should be of a very fine mesh. The top as well as the sides should be made of netting, in order to insure the best ventilation. A strip of thin muslin ten or twelve inches wide should be sewed around the lower edge. Part of this is tucked in, and the remaining portion protects the arm or leg from being bitten by mosquitoes when it is thrown out against the net during sleep. An absolute rule should be always to carry a good mosquito net when traveling, and never to take any risks by sleeping without it.

GENERAL ITEMS

Smallpox is very prevalent in tropical countries. One should be revaccinated before going to the tropics, and then revaccinated every two years during residence there.



Sun Helmet

Vaccination against typhoid is to be strongly advised for all who must travel much. This precaution should be taken in case any other members of the household are afflicted with typhoid. With reference to typhoid and cholera, it is well to have a care concerning the native help hired; for among them are found those who have had typhoid or cholera, and although they have recovered, continue to carry the disease, and in their bowel discharges can be found the cholera or typhoid germs. In case several members of a household should come down with typhoid, and the cause could not be found elsewhere, it would be well to have the cook and the table boy examined by a competent physician.

Overeating and underexercising is at the foundation of much ill health in all climes, but especially in the tropics. Some active physical exercise, such as tennis or golf, should be taken regularly, even in the hottest weather.

CHAPTER 75

Constitutional Diseases

DISEASES OF METABOLISM

Food elements, after being absorbed from the intestinal canal, undergo numerous changes in the body. Some are broken down at once into simpler compounds and eliminated. Some are stored in the body, to be used later. Others serve to build up the different tissues of the body, and afterwards disintegrate and are eliminated as waste matter. This building up and tearing down chemical process within the body is called *metabolism*.

Normally these metabolic processes may be likened to the fires of life, which burn brightest in youth, and smolder in old age, and may be modified by various known and unknown influences, anywhere along life's course.

With all functions of the body progressing normally, we have the food elements—proteins, fats, and carbohydrates—utilized and their chemical end products eliminated without any disturbance to the health of the body.

In certain disorders, the primary cause is apparently the faulty metabolism of some one of these food elements; and these conditions are called diseases of metabolism. The more important examples are diabetes mellitus, obesity, and gout.

In many other diseases, metabolism is considerably disturbed secondarily; notably in exophthalmic goiters (see chapter 37), and in diseases of nutrition (see chapter 23).

DIABETES

Diabetes mellitus, or sugar diabetes, is a disorder of metabolism in which there is an abnormal amount of sugar in the blood, and a persistent presence of it in the urine.

Cause: The cause of this disorder is not well understood, although there seems to be more and more evidence to prove that some of the internal secretory organs are primarily at fault, particularly the pancreas.

Diabetes has frequently been observed to occur in members of the same family, indicating a hereditary tendency. The Hebrew race is especially susceptible. It is less commonly seen

in the colored race. It is more common in males between the ages of thirty-five and sixty years. Obesity, sedentary habits, and emotional and nervous strain seem to predispose to it.

Symptoms: Great thirst and excessive urination are often the first symptoms that arouse the patient's suspicions and lead him to seek medical counsel. The appetite is abnormally large and sometimes almost insatiable. The intense craving for starchy and sweet foods often leads a person who is on a strict diet to surreptitious indulgence of his appetite. Some will buy sweets, and eat them on the sly, or even help themselves to food that does not belong to them. There is a gradual loss of weight, which, with the voracious appetite, forms a picture seldom seen except in diabetes. Constipation is the rule. There is progressive muscular weakness. The onset is usually gradual, and the course long, during which various complications are likely to appear, such as boils, carbuncles, cataract, pruritus (itching), neuritis (especially sciatica), ulcers, nephritis, impotence, gangrene, and coma. Diabetics also seem to have an extraordinary susceptibility to tuberculosis.

Probable Outcome: Rarely diabetes is of an acute form, in which the duration may not exceed a few weeks or months at most. In the usual chronic forms, the duration is a matter of years. The more severe the form, and the younger the person in whom it appears, the more serious the outlook, and the shorter the course. However, there are cases of this severity that have apparently recovered.

The milder the type, and the greater the age at which it first appears, the better the prognosis. It is better in stout persons than in the lean. Children in most instances die in coma; older persons less often. Complications, intercurrent infections, and tuberculosis claim a considerable percentage of all cases. Many apparently get well. Others of a mild type live out the average expectation of life, and die of something entirely unrelated to diabetes.

Acidosis and Diabetic Coma. Coma results from the accumulation of acid bodies in the blood; and since it is so often a complication in these patients, its premonitory signs should be recognized. The patient generally feels extraordinarily weak. There is a peculiar fruity odor to the breath. But the principal and most pronounced symptom is the deep and rather rapid respiration, sometimes called "air hunger." If this condition is allowed to continue, it is very likely to terminate in coma—a state of more or less complete unconsciousness.

The Urinary Sugar. The daily amount of urine may vary from four or five pints to several gallons. The amount of sugar also varies greatly, from a fraction of one per cent in the mild cases to five per cent or more in the severe attacks.

The test for urinary sugar is simple and can be made readily by anyone. However, unless a person has diabetes and is endeavoring to keep sugar-free by an intelligent control of the diet, nothing is to be gained by his examination of his own urine. His conclusions are likely to be erroneous, and nervous persons tend to become introspective and morbid.

The things necessary for the test can be procured at any drug store; namely, a bottle of Fehling's solution, prepared ready for use, a few glass test tubes, and an alcohol lamp. Pour a little of the Fehling's solution into a test tube—about an inch in the bottom of the tube is sufficient—and heat to the boiling point over the alcohol flame. If the solution is right, it will remain blue and unchanged. Now add five or six drops of urine and heat again. If no sugar is present, there still will be no change in the solution; but if sugar is present, the blue color will disappear, and a yellow or brick-red, cloudy precipitate will take its place.

Treatment: The rational and modern procedure in the treatment of diabetes is, first to determine the limit of the ability of the patient to utilize or burn up starch and sugar, and then he must learn how to eat so as to keep the body sufficiently nourished without exceeding this limit and causing sugar to appear in the urine. The most direct way to determine this is to require the patient to abstain from all food except clear vegetable broth or bouillon for three or four days, unless the urine is sugar-free before, and then gradually and cautiously add carbohydrate food until sugar appears in the urine. Some knowledge of food value is necessary to the greatest success of this undertaking.

The following is a suggestive program for the milder cases:

1. Broth and water only, as suggested above, until the urine is sugar-free.
2. Add five or ten ounces of any of the five per cent vegetables.¹
3. The next day, add five or ten ounces more of the five per cent vegetables.
4. As long as the twenty-four-hour urine remains sugar-free, continue to add daily eight or ten ounces more of the five per cent vegetables; or, instead, five ounces of the ten per cent vegetables

¹ Vegetables containing five per cent or less of carbohydrates: lettuce, cucumbers, tomatoes, asparagus, spinach, beet greens, celery, dandelion greens, Swiss chard, Brussels sprouts, okra, cauliflower, cabbage, eggplant, radishes, string beans.

or fruit, or three ounces of the fifteen per cent vegetables or fruit, or two ounces of the twenty per cent vegetables or fruit.²

5. As soon as sugar appears in the urine, fast for one day, or longer if necessary to render the urine sugar-free again; then, reducing the carbohydrates one third, continue the diet as before, and begin to include protein and fat by adding eggs, cottage cheese, skimmed milk, gluten bread or biscuits, olives, butter, oil, fats, cream, soy beans, nuts, and, if desired, lean meats, chicken, and fish.

These also should be added cautiously, for the reason that some of them contain more or less carbohydrates, and a too free use of them could easily cause one to exceed his carbohydrate tolerance.

6. The appearance of sugar in the urine should be followed by a fast until its disappearance, and this in turn by the resumption of a somewhat diminished diet.

With many cases, the longer they can keep sugar-free, the greater is their carbohydrate tolerance. A helpful practice is to set apart one day each week as a fast day, taking no food at all, or greatly reducing the food for that day.

Besides appropriate diet, other phases of hygienic living are important, such as good bowel action, moderate exercise unless the patient is too weak, a daily tepid or cool bath, out-of-door life in a temperate climate, pleasant, well ventilated sleeping apartments, freedom from worry and mental excitement.

An intelligent and careful coöperation with the physician is essential to the successful conduct of a case of diabetes. The more severe cases should be constantly under a physician's care, and every case should be seen regularly.

OBESITY

Corpulence, or an excessive accumulation of bodily fat, generally seems to be brought about by two factors: one, a constitutional fault, in which the ability of the tissues to burn up the absorbed food substances is below normal, and in which there is also a tendency, often hereditary, for the body to store these food substances in the form of fat; the other, a gastronomic fault, in which the person is disposed to eat more than his body needs or can utilize in its ordinary functions.

² Vegetables containing more than five per cent but less than ten per cent carbohydrates: squash, carrots, onions, beets, turnips, and pumpkin. Fruits containing ten per cent or less of sugar: oranges, lemons, peaches, pineapples, strawberries, gooseberries, cranberries, watermelon, and grapefruit. Vegetables approximately fifteen per cent carbohydrates: green peas, parsnips, Lima beans. Fruits containing approximately fifteen per cent sugar: cherries, apples, pears, apricots, currants, raspberries, and blueberries. Vegetables twenty per cent carbohydrates: potatoes, shell beans, baked beans, and green corn. Also the fruits, plums, bananas, and prunes, contain about twenty per cent sugar.

The conditions predisposing to obesity are therefore heredity, age (middle life), sex (more often in women), sedentary habits, phlegmatic temperament, and a warm climate.

The exciting causes are, especially, excessive use of the energy foods,—starch, sugar, and fats,—with deficient exercise.

Some cases of obesity appear to be due to a disturbance in the function of the thyroid and pituitary glands.

Symptoms: Except for some inconvenience, obesity is not accompanied by any symptoms at first. In the course of time, however, the sense of burdensomeness when working becomes more pronounced. Breathlessness on exertion is experienced because of the weakened fatty heart, the hampered diaphragm, and the heavy chest walls. The muscles are often flabby and weak. Palpitation, headaches, and dizziness are of frequent occurrence; and in many cases, there is a marked tendency to fall asleep. Skin affections, such as eczema, excessive sweating, itching, and loss of hair, are common.

Obese persons are subject to various neuralgic and rheumatic troubles, so that in addition to their excessive burden of weight, they have sore and painful joints.

Treatment: Medicinal treatment is not satisfactory, as a rule. Some of the advertised cures are positively harmful. The dietetic treatment is the most important. It may be applied to all cases, and if properly and perseveringly carried out, is practically always successful. While ordinarily the diet should be outlined to suit the conditions in each individual case, by some one competent to do it, yet in a general way, for a stout person in average health otherwise, who wishes to lose in weight, the essential thing in the plan is to reduce the energy foods only (fats, starches, and sugars), so that the person may lose from one to four pounds a week. The protein or nitrogenous foods should not be proportionately reduced. In many persons, it is necessary to reduce the total daily food to 1,200 calories or less. Of this, the protein should comprise 250 or 300 calories. (See chapter 20.)

It is well to choose a large part of the diet from the so-called protective foods, particularly fruits and the leafy and green vegetables.

It is surprising on how small an amount of food obese persons can subsist without losing in weight. With them, heat dissipation is decreased because of the thick layer of fat under the skin; and as they need less fuel to keep them warm, body heat production is decreased. Thus there results a kind of fireless-cooker arrangement, which is a fine thing in the kitchen, but not in the body.

To help overcome this, exercise is important. Obesity tends to diminish the inclination to exercise; and those who follow this inclination will experience a weakening and wasting of their voluntary muscles. Since it is in the muscles that oxidation is principally carried on, these should be well developed and active, to burn up the excess fat. Exercise that requires the action of the large muscles should be taken, such as walking, rowing, and chopping or sawing wood. If these are not possible, then resort to systematic work with dumb-bells, and to various gymnastic maneuvers that may be practiced conveniently indoors.

Elderly persons who have high blood pressure and dusky lips, and get short of breath on slight exertion, should proceed rather cautiously, and choose only the milder forms of exercise, because of the weakened heart muscle. They should depend more on the dietetic treatment. Many fat persons will not admit that they overeat; and in fact, if we use an average person as a standard in passing judgment upon them, a large percentage of the obese must stand acquitted. Nevertheless, they all eat more than they need, be their daily intake ever so little; and in order for them to lose in weight, the quantity must be reduced for a time. With an increase of the muscular activity and a reduction of the bodily weight, the powers of oxidation increase.

Many patients who have been successful in reducing their weight through exercise and proper diet are highly pleased to find that their rheumatic and neuralgic pains and headaches have disappeared along with the excess fat, and that their physical and mental efficiency has been greatly increased.

GOUT

This is a comparatively rare disease, although it is probably often overlooked. In a great measure, it is a cultivated disease, and due largely to wrong habits of living.

The soil, so to speak, upon which the sufferer cultivates his affliction (metabolic disfunction—disturbance of metabolism) is not well understood. There seems to be an inherited element causing a tendency to this particular disease. Like most cultivated diseases, it appears as one approaches middle life, being most common between the ages of thirty and fifty years. It occurs most frequently in men in the upper classes of society, but is also seen among the poorer classes, notably in those who work in lead.

Causes: A very constant exciting cause is the habitual use of alcoholic beverages. Overeating, especially of the nitrogenous foods, with too little muscular activity, has always been ranked one of the chief factors. Meats, particularly certain kinds, such

as liver, sweetbreads, calves' brains, and others rich in nucleins, which yield uric acid and other purines, seem to be especially hard for a gouty person to burn up in the tissues.

Symptoms: There are two principal forms,—acute and chronic. The first manifestation is usually an acute attack similar to an attack of acute rheumatism, except that generally there is but one joint involved (oftenest the first joint of the great toe), and but very little fever. The joint is swollen, red, and shiny, and acutely painful. Dyspeptic disorders, depression of spirits, and irritability often precede the attack. Ordinarily the attack comes on during the night and subsides in a few hours. The patient is fairly comfortable during the day, but is likely to have another paroxysm the following night.

Chronic gout follows repeated attacks of the acute variety, and acute periods may occur throughout its course. In time, other joints become involved, and nodules form on the ears and about the joints. The tophi, as they are called, are composed of a salt of uric acid, which is greatly increased in the blood of all gouty persons. Chronic inflammation of the kidneys, hardening of the arteries, high blood pressure, and enlargement of the heart finally develop in the majority of cases.

Treatment: Certain medicines give considerable relief. Some are considered as almost a specific for the pains of an acute attack, but prescriptions for these must be left to the judgment of the attending physician. The fomentations and hot compresses prove to be very comforting to the painful joints.

Preventive hygienic measures are of most importance. Total abstinence from the use of alcoholic drinks, and rigid habits of living, should be followed if one is of a gouty family. An active out-of-door life should be chosen. Choose a vegetarian diet, using green, leafy vegetables and fresh fruit plentifully. The protein foods, a certain amount of which, of course, is always necessary, are best taken in the form of milk and eggs.

Regular bathing is helpful. Cold baths, with friction, between the attacks, and hot packs for the acute temporary recurrent attacks, are to be recommended. By beginning early with these dietetic and other hygienic measures, it is possible, in practically all cases of gout, to prevent its development and progress; and incidentally, thereby a number of other chronic afflictions often found associated with gout will also be prevented.

Focal Infection

There are various places in the body where germs lodge and grow, remaining often for long periods of time, yet causing, in that place of lodgment, few or no symptoms of which the patient is aware. From these places of bacterial lodgment and growth, the germs may be carried by the blood stream and the lymphatic vessels to distant parts of the body, and there set up a secondary disease. This may be painful, immediately serious, or fatal, or, in course of time, crippling, and so result in partial or total disability. Of such secondary diseases, there are many, as we shall see later. The original or primary place of lodgment of the bacteria is called a *focus of infection*.

TEETH AND TONSILS

Although there are many such places in the body, there are two that are so often points or foci of infection as to make them of very great importance. These are the teeth and the tonsils. It has been recognized for many years that an attack of tonsillitis often precedes by a few days or weeks an attack of acute inflammatory rheumatism, or an attack of St. Vitus's dance (chorea). It has also been recognized that disease of the teeth may bear some special relation to disease of other parts or organs. More than a century ago Dr. Benjamin Rush, one of the most noted physicians of his day, called attention to this fact, as is shown by the following paragraphs quoted from his writings:

"Sometime in the month of October, 1801, I attended Miss A. C. with rheumatism in her hip joint, which yielded, for a while, to the several remedies for that disease. In the month of November it returned with great violence, accompanied with a severe toothache. Suspecting the rheumatic affection was excited by pain in her tooth, which was decayed, I directed it to be extracted. The rheumatism immediately left her hip, and she recovered in a few days. She has continued ever since to be free from it.

"Soon after this I was consulted by Mrs. J. R., who had been affected for several weeks with dyspepsia and toothache. Her tooth, though no mark of decay appeared in it, was drawn by my advice. The next day she was relieved from her distressing stomach complaint, and has continued ever since to enjoy good health. From the soundness of the external part of the tooth, and the adjoining gum, there was no reason to suspect a discharge of matter from it had produced the disease in her stomach."

Fortunate indeed would we be if in every ailing part of the body there were pain or some sort of distress to indicate the location or source of trouble. But such is not always the case. Toothache does not always or even commonly precede or accompany diseases due to dental infection. Indeed, in by far the larger number of diseases that may be traced to the teeth as the primary source of infection, it is the exception rather than the rule for pain or even tenderness of the teeth to exist. Pyorrhea is nearly always a painless disease. Infection may be present in the pulp cavity of devitalized or even untreated teeth, without the slightest pain. Abscesses or "pus sacs" (apical abscesses) at the apex of the roots often become very large and destroy much bone without causing pain.

Secondary diseases due to infection in the tonsils are not always or perhaps in even a large portion of cases preceded by tonsillitis. Some do not give a history of even frequent sore throat. And still further, many persons with serious disease originating in tonsillar infection have tonsils which to outward appearances are healthy. Oftentimes only by firm pressure on the tonsils can little masses of cheesy matter or liquid pus be squeezed out from the pockets or crypts. Such tonsils may be very small, and are often pronounced healthy by physicians; or the tonsil is so buried between the pillars of the tonsil that the patient is told he has no tonsils. These may be the source of just as serious trouble as tonsils that are large and obviously diseased. The size or appearance of the tonsils may bear no relation whatever to the existence or seriousness of secondary disease.

PYORRHEA

Pyorrhea alveolaris, or Rigg's disease, begins around the tooth at the gum margin, and works downward around it, destroying the cement substance and the bone (alveolar process) that holds the tooth. This may be all around a tooth, or only on one side, in the form of a shallow or deep pus pocket. It may involve only one root of a tooth, so that the tooth remains firmly fastened by the other roots. A tooth with a single root may be surrounded as by a crater, being held in the bone by only the tip of the root. Such teeth sooner or later become very loose.

Causes: Pyorrhea may be due to several causes, chief among which is lack of cleanliness. Were the teeth cleaned regularly from childhood by the daily use of a toothbrush and a good dental cream, with more skilled attention at proper intervals by a competent dentist, there would be but little pyorrhea. Very few persons reach thirty years of age without some evidence of pyorrhea, and practically all persons of fifty show more or less

extensive involvement. It may occur in childhood, though it is rare before the fifteenth year.

A very exceptional case coming under our notice was that of a lady eighty-two years of age. All her teeth were sound, and not a trace of pyorrhea could be found. She stated that since a little child, she had used a toothbrush three times a day, and silk floss to clean between the teeth at night.

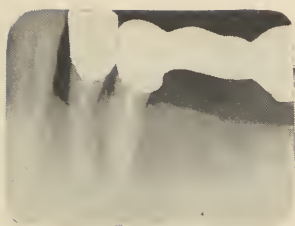
Pyorrhea is likely to start with an acute illness or a period of ill health, such as an attack of typhoid fever, influenza, chronic indigestion or constipation. It also complicates diabetes, tuberculosis, pregnancy, and lactation. Acute or chronic infections of the tonsils predispose to pyorrhea. So also do alcoholism, lead poisoning, and the use of calomel or other form of mercury as medicine. Mouth breathing from adenoids and large tonsils, and the resulting bad position of the teeth, are also causes of pyorrhea.

Treatment: Prevention is the most important thing in the treatment of this malady. In other words, we should take such good care of the mouth that the disease will not occur. One of its causes is the tartar that collects on the teeth. This should be cleaned off by a dentist frequently — how frequently depends upon the rapidity with which it collects. No matter how careful you may be, you cannot entirely prevent its collection. Therefore you may need to go to the dentist a number of times a year and have this tartar removed. At the same time, if you are in the hands of a good dentist, you will be advised regarding the general condition of your mouth, and any other troubles therein that might be arising.

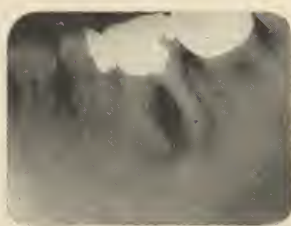
When pyorrhea is already present, the most important thing still in the treatment is to keep the tartar cleaned from the teeth. Nearly every city to-day has pyorrhea specialists. With specially designed instruments, they scrape away the tartar from the teeth, and polish the surfaces, thus destroying niches that might harbor the infection. The teeth should be brushed thoroughly with a good dentifrice upon arising in the morning and after eating. This should never be neglected, and the habit is one which should be cultivated in all children as soon as they have teeth.

ALVEOLAR ABSCESSSES

Abcesses in the bone about the teeth may be due to pyorrhea, or they may arise from infection within the tooth. Devitalized teeth sooner or later show evidence of infection or an abscess at the apex. One observer reports the finding of abscesses at the roots of forty-seven per cent of devitalized teeth in persons under



Note the bone absorption about the roots of these two devitalized and crowned teeth, one of which supports a piece of bridge work. The white lines show filled root canals.



Observe the apical abscesses (black areas) about the roots of these dead molars, one of which is crowned, and the other contains a large filling.



Left: An apical abscess (pus sac) is shown by the black area at the roots of these two dead teeth, one of which is a capped or peg tooth.

Right: Note the bone absorption about all the roots, and the entire loss of bone (deep pyorrheal pocket) about the roots of the devitalized tooth in the center.



forty years of age. These were persons examined without reference to their state of health or the condition of the mouth. Another, in 1,000 *medical* cases over forty years of age, found areas of bone destruction in eighty-one per cent of non-vital teeth.

The crowning of teeth is also responsible for many apical abscesses. Sixty-five per cent of crowned though vital teeth show evidence of infection at the root. The crowning of teeth is rarely advised by the best of modern dentists. This great frequency of deep pyorrhea and apical abscesses was not fully appreciated until the practice of X ray examination became common, and to-day no dental examination is considered complete without a full X ray of the teeth. Nor should the X ray examination be limited to suspicious teeth, such as devitalized teeth or those supporting crown and bridge work. Even vital teeth may be infected at the root.

The Dominant Germ. There are many different germs found in infected tonsils and in and about infected teeth, but it is almost exclusively one germ which gives rise to focal infection. This germ is the streptococcus (*strepto*—chain; *coccus*—ball),

so called because it is a little round or ball-shaped germ, which grows in chain formation. This germ possesses the ability to grow under a wide variety of conditions as to heat, oxygen, soil, *et cetera*. It is because of this property that it produces so many different diseases. When grown in those parts of the body having a higher temperature, a rich blood supply, and much oxygen, such as the lungs and the heart, it acquires the properties that give it ability to produce acute diseases, such as pneumonia and malignant inflammation of the heart. When grown at a lower temperature, in the presence of a poor blood supply and less oxygen, it produces chronic, slowly progressing diseases, such as chronic articular rheumatism.

In addition to this, when it grows in a certain organ, it tends to remain in that part; and if then taken from that part and injected into an animal, it has a very great tendency to lodge in the same organs in the animal, from which it was taken in man or other animals. For example, if taken from the gall bladder of a man and injected into the blood of animals, it will lodge in the gall bladder of these animals in eighty per cent of cases. If taken from ulcer of the stomach or of the duodenum and injected into animals, it lodges in the stomach or duodenum of the animals, producing ulcer in these organs in sixty per cent of cases. The same is true of the germ when taken from any other organ of the body where it has produced disease. That is, it has a strong affinity for the same organ in an animal, where it can grow under the same conditions of soil to which it has been accustomed.

A HOST OF DISEASES

The following is a list of diseases that are known to be due to the streptococcus, or which, at least in some cases, have been caused by it either directly, or indirectly by focal infection. It should be clear, however, that not all of them by any means are always due to focal infection, and some of them perhaps only rarely are. The names of a few of the more common diseases are printed in *italic*.

Diseases of the mouth and throat which serve as foci of infection:

- Tonsillitis
- Sore throat
- Quinsy
- Pyorrhea
- Apical abscesses

Diseases of the heart, blood, and blood vessels:

Simple endocarditis (acute rheumatism of the heart), resulting in chronic valvular disease of the heart.

Malignant or ulcerative endocarditis (a fatal disease)
 Myocarditis (weakness of heart muscle)
 Pericarditis (inflammation of the covering of the heart)
 Arrhythmia (irregular beat)
 Septicæmia (blood poisoning)
 Endarteritis obliterans
 Phlebitis (inflammation of a vein, such as milk leg)
 Thrombophlebitis

Diseases of the organs of respiration:

Pneumonia
 Pleurisy
 Empyema
 Frequent colds
 Asthma

Diseases of the digestive tract:

Mumps
Ulcer of stomach and duodenum
Cholecystitis (infection of the gall bladder)
Gall stones resulting from diseased gall bladder
Appendicitis
 Peritonitis
 Pancreatitis

When focal infections are combined with certain poisons, they also help to cause acute yellow atrophy of the liver and cirrhosis of the liver.

Diseases of the urinary tract:

Acute nephritis (acute Bright's disease)
 Chronic nephritis
Pyelitis and *pyelonephritis*
 Cystitis (inflammation of the urinary bladder)

Diseases of the nervous system and the eye:

Chorea (St. Vitus's dance)
 Spinal myelitis (inflammation of spinal cord)
 Cerebrospinal meningitis
Neuritis, including *sciatica*
 Multiple neuritis
 Transverse myelitis
 Trigeminal neuralgia
 Multiple sclerosis
 Pseudotabes (locomotor ataxia not due to syphilis)
 Neurasthenia
 Paralysis, as hemiplegia from cerebral thrombosis
 Acute insanity (rarely)
 Neuroretinitis (defective sight or blindness results)
Rheumatic iritis and *iridocyclitis*
Rheumatic keratitis (inflammation of cornea)
 Recurrent ulcer of the cornea
 Blepharitis (inflamed eyelid margins)
 Episcleritis

Diseases of muscles, joints, and bones:

Myositis (muscular rheumatism) and lumbago
Acute infectious arthritis (acute rheumatism)
Chronic infectious arthritis (chronic rheumatism)
Arthritis deformans (deforming rheumatism)
 Spondylitis
 Bursitis
Rheumatic fever (acute inflammatory rheumatism)
 Osteomyelitis
 Periostitis

Diseases of the skin:

Erysipelas (St. Anthony's fire)
 Erythema nodosum (red swellings under the skin)
 Erythema multiforme (a skin disease)
 Herpes zoster (shingles), which also is a disease of a nerve
 Hives (few cases)
 Furunculosis (boils)

Diseases of the lymphatics and subcutaneous tissues:

Erysipelas (streptococcus infection of the lymphatics of the skin)
 Elephantiasis (non-tropical variety only)
Glandular fever (common in young children)
 Adenitis or lymphadenitis
 Cellulitis (especially of the neck)

Diseases of the ductless glands:

Thyroiditis (certain cases of goiter)
 Chronic catarrhal deafness (This and other acute and chronic ear diseases are more likely due to direct infection from the tonsil along the Eustachian tube into the ear.)
 Toxic headaches

Definite harmful effects from focal infections are seen in many other diseases besides those due to the streptococcus, hindering the patient from receiving benefit from treatment. The more important of these are:

Syphilis
 Tuberculosis
 Diabetes
 Gonorrhea
 Asthma
 Bronchitis
 Locomotor ataxia, especially with lightning pains and other nerve disturbances

SOURCES OF INFECTION

In addition to the foregoing, we have seen several patients who have had a peculiar sensitiveness to certain foods, the eating of which would produce itching, hives, or bladder irritation, and who have been relieved by the removal of foci of infection. An-

other patient who had had almost constant pain and sensitiveness of the appendix (chronic appendicitis) for three years was entirely relieved by the extraction of a tooth showing a deep pyorrheal pocket.

Where any of these diseases exist, a very careful examination should be made by a competent physician, to determine the source of the infection. X ray examination of all the teeth is necessary, especially in adults. In young children, the tonsils are more frequently the focus of infection. It is usually necessary to add to this the examination of the teeth by a "modern dentist," the physician and the dentist working together. It must be remembered that one had better lose a tooth or two or even all the teeth than to suffer of serious disease or of disabling, crippling disease. Few realize what serious consequences result from these focal infections, and often utterly refuse to part with a few teeth or their tonsils. Certainly after five years of age, the tonsils have no function that is not adequately performed by other lymphatic glands; and even before that age, some children may require removal of the tonsils. Lymph gland tissue is an active living filter, and very rapidly becomes hopelessly diseased if subjected to frequent acute infections. This is especially true of the tonsils and the appendix, which are separated from surfaces where germs always exist by only a thin mucous membrane. The appendix contains much lymphoid tissue, and so, like the tonsils, may itself serve as a source of focal infection.

A brief account of a few cases of focal infection will help to show the great practical importance of this subject.

SEVERE ENDOCARDITIS

A little boy seven years of age, together with an older sister and the mother, had an acute attack of a severe streptococcus tonsillitis in the spring of the year. The family physician advised the removal of the tonsils as soon as the acute attack had fully subsided. This advice, however, was not followed. In November of the same year, the mother brought the boy to the physician's office, complaining of an indefinite indisposition, with loss of appetite and enlargement of the lymphatic glands of the neck.

In ten days, the mother returned with the boy, who now had a swollen right knee and more swollen lymphatic glands. Directions for treatment were given, and the boy was taken home and put to bed. Inside of twenty-four hours, the physician was called to the home, and found the little patient's temperature over 102°, with a knee so painful that it could hardly be touched at all, and with marked tenderness over the appendix. As this was con-

sidered to be an infection of the lymphatic tissues generally, an operation was not advised.

The next day, the physician was hurriedly summoned to the home, and found the boy with a temperature of over 103° and a pulse rate of 160, which had suddenly developed shortly before he was called. A stethoscope was hardly necessary to examine the heart, as the chest wall thumped violently with every heart-beat, and the sound of the damaged valve could be plainly heard at the distance of a foot or two from the chest wall. The violent onset, with extreme damage to the heart valve, made it appear that a malignant inflammation of heart valves (endocarditis) would end the scene in a short time.

At the same time, the older sister was taken with fever, and a scarlet rash covered the entire body. In two days, she developed a slight but definite disease of her mitral heart valve. The disease was not scarlet fever, but a streptococcus infection.

Both children recovered, the girl with but a very slight heart damage. The boy, however, recovered only after a long period of illness, and with severe and permanent damage to the heart. He will never be able to perform a man's work, even should he be so fortunate as to escape another attack and reach adult life. As long as he retains his tonsils, he will be in danger of a return of the acute endocarditis, which must almost inevitably prove fatal, because occurring on an already extremely damaged valve. On the other hand, the removal of the tonsils does not entirely preclude another attack, since the infection has now been spread to practically every lymph gland in his body. Besides all this, while the tonsils may be and often are removed when the heart is so badly damaged, yet the operation is fraught with considerable risk, even in the hands of the most skillful operator.

Endocarditis is a very common complication of rheumatic fever (acute inflammatory rheumatism), and is the direct cause of the majority of cases of chronic organic valvular disease of the heart.

In children who have had rheumatic fever, about seventy-five per cent show evidence of endocarditis. It is interesting to note, in this connection, that in Bellevue Hospital, in 1907, about two and a half per cent of all cases admitted were rheumatic fever; whereas in 1919, the per cent had decreased to about one half of one per cent. This decrease is attributed to the awakening of the medical and dental professions and the general public to the importance of the teeth and the tonsils as sources of rheumatic infection.

ST. VITUS'S DANCE (CHOREA)

A girl about nine years of age had repeated attacks of tonsillitis; and her tonsils were "clipped," as was customary several years ago. At the age of fourteen years, she developed acute chorea (St. Vitus's dance); and a little later, this was complicated by erythema nodosum (large, swollen, red areas under the skin). Two years later, she died of a generalized infection.

More fortunate was another child, a boy twelve years old, who was taken with acute chorea, and whose tonsils were immediately removed. The operation was followed by quick recovery.

Another patient, a girl of nineteen years, had an attack of left-sided paralysis when seven years of age, which lasted a year. This was followed by chorea lasting two years. Following *grippe* at sixteen years, she had chorea again, which troubled her much of the time for three years. Removal of the tonsils brought entire relief from the chorea, a rapid gain in weight, and perfect health.

BRIGHT'S DISEASE (NEPHRITIS)

The large majority of cases of acute nephritis in children are attributable to infected tonsils, some following the tonsil infection of scarlet fever. At the New York Postgraduate Hospital, every child having nephritis is advised to have the tonsils out as soon as conditions of health permit.

Infected teeth also are a very common source of nephritis, as shown by the following brief history: A woman about thirty years of age had a large dental abscess deep in the bone. The local infection was quickly followed by very severe acute Bright's disease. The dropsy was extreme, and involved the entire body. With careful and prolonged care over many months, the patient made considerable improvement, but the kidneys were too badly damaged to permit of full recovery.

PYELITIS

Pyelitis is another disease of the kidneys which is very common, especially in babies. Pus cells and colon bacilli (germs normally present in the intestine) are found in the urine. The patients have very frequent and painful urination. Recently at the Mayo Clinic, twelve chronic cases of pyelitis and similar conditions were shown to have dental abscesses or infected tonsils; and the streptococci from these sources, when injected into rabbits, produced in them the same disease, and changes in the urinary organs, and pus cells in the urine. The removal of the infected teeth and tonsils relieved the patients from their frequent or painful urination, and the pus disappeared from the urine, thus proving conclusively that the pyelitis was a result

of focal infection. The writer has had the same results with his own patients who have suffered of chronic pyelitis.

NEURITIS AND SCIATICA

These conditions are so common, and yield so promptly to the removal of focal infections, that there can no longer be any doubt as to the cause. Neuritis from tonsil infection is very common about the back of the neck and the shoulders. Careful inquiry will often elicit the information that an attack of tonsillitis or sore throat immediately preceded the neuritis. Infected teeth are perhaps more likely to give neuritis of the arms or legs, such as sciatica, or even lumbago, which is a form of muscular rheumatism.

A patient fifty-seven years of age complained of choking sensation on exertion, pain in the legs on walking, and aching and pain about hips and thighs. The white blood cells were found nearly twice the normal number, and the streptococcus was found in the blood. There was no rise in temperature except occasionally to ninety-nine degrees for a little time at 3 P. M. The blood pressure was 190, whereas the normal systolic blood pressure is 122 mm. The tonsils each showed a small pocket of pus. They were removed, and the patient states that the pain and aching about the hips and thighs disappeared from the date of operation. In a month, the blood pressure had dropped to 155; and a little later, the germs disappeared from the blood, and the white cells returned to normal number. About ninety-five per cent of all cases of neuritis seem to be due to focal infections.

ARTHRITIS DEFORMANS

A woman about thirty years of age had had several attacks of tonsillitis as a girl, one of which was followed by acute inflammatory rheumatism, and another by chronic rheumatism, from which she had never entirely recovered. For the last five years, she had suffered of arthritis deformans to such a degree that the bones of the hands and feet were hopelessly diseased and she was unable to do her ordinary housework. The removal of her tonsils and the giving of a vaccine made from the infection found in them and later from the lymphatic glands, produced a very marked improvement. Yet it was three months after the removal of the tonsils before the benefit was sufficient to be certain. The vaccine was given once a week over a period of about fourteen months, with the final result that the pain, swelling, and soreness of the diseased joints entirely disappeared, and the patient was able to do much of her own housework and walk moderate distances without pain. The disease, however, had progressed too far for full recovery.

Many patients with chronic rheumatism recover entirely after the removal of infected teeth or tonsils, provided the bones are not involved. From the Mayo Clinic, about eighty per cent of cases of chronic arthritis improve after removal of the tonsils and extraction of infected teeth, though the average duration of the disease in those who improve had been eight years. The average time after operation before improvement is manifest is three months. One of the writer's patients who had severe rheumatism, with large swellings in each wrist, of three months' duration, entirely recovered from the pain and swelling after removal of the tonsils and fifteen months' use of a vaccine prepared from the germs found in the tonsil.

OTHER FOCAL INFECTIONS

There are many patients who are taken with a severe attack of fever, with much pain in joints, limbs, nerves, muscles, and bowels, often lasting several weeks or months, in whom the cause can be determined only by a careful examination of teeth and tonsils. These cases have been quite common since the influenza epidemic of 1918 and 1919. The majority show many abscessed teeth, and some show infected tonsils or nasal sinuses as well. The following sad case is very instructive:

A woman of forty-six years had an acute articular rheumatism and neuritis, with the pain mostly in the knees and the thighs. X ray showed pyorrhea around the few remaining teeth, one exhibiting a deep, craterlike pocket in the bone. This patient had also an infection of both antra (sinuses at the side of the nose), which had been operated upon and were now clean. The rheumatism cleared up nearly altogether in two weeks, though the patient consented to the removal of only the one very bad tooth, saying she would rather die than be toothless. One month later she was taken suddenly with a left-sided paralysis. The blood pressure was not high. She became gradually worse, with fever, high white cell count, and streptococci in the blood. The kidneys showed some inflammation. She had two attacks of acute dropsy of the lungs, in the second of which she died, ten weeks from the date of the paralysis.

Neither the appearance of the tonsils nor a history of tonsillitis or sore throat can be relied upon to reveal the source of all these diseases, as is well shown by the two following histories:

Of two sisters, aged respectively twenty-nine and thirty-one, the older gives a history of "rheumatism" (neuritis) in the left shoulder, lasting one year. This disappeared, and was followed by iritis of the right eye, continuing six weeks. She had never had tonsillitis or frequent sore throat.

The younger had had both frequent sore throat and a great deal of tonsillitis, but no rheumatism, neuritis, nor iritis. Both sisters had had acute appendicitis and been operated. Removal of the tonsils showed these organs badly infected in both cases.

Likewise in the case of dental infections, even the X ray does not always show evidence of disease in the infected tooth or about it. A youth eighteen years of age complained of lack of energy and felt unable to work. He had recently had an acute fever. He had a slight rise in temperature, and the white cell count was too high (evidence of infection somewhere in the body). There were small remnants of tonsils on both sides. The teeth appeared perfectly healthy. He had a little tenderness over the kidneys, and at times a few pus cells in the urine. His tonsils were removed, with but little benefit. He was carefully studied and watched for a period of five months. Nothing further was found except that a streptococcus was obtained from blood culture. At last, all his teeth, though appearing healthy, were X-rayed; but the films showed not the slightest suspicion of disease about the roots, nor any devitalized teeth. The films and the patient were sent to a dentist, who discovered a porcelain filling so placed that it touched the pulp cavity. This was removed, and the same germ previously found in his blood was recovered from the tooth. Extraction of the tooth resulted in complete recovery, the white cell count and the temperature dropping to normal.

There are other sources of focal infection besides the teeth and the tonsils, including the accessory sinuses of the nose (frontal, sphenoid, ethmoid, and antrum), the appendix, and in some cases, the intestine itself, the gall bladder, the prostate in men, and the Fallopian tubes in women. Rarely other places in the body are the source of focal infection.

INFLUENCE OF FOCAL INFECTION ON OTHER DISEASES

A man forty years of age, a butler in a wealthy home, complained of cough and much loss of weight and strength. On examination, it was found that he had an acute tubercular process in the lungs, with tubercle bacilli in the sputum. Thorough routine examination and X ray also revealed many abscessed teeth. He was advised that he must quit his work and make a business of recovering his health, the first step in which would be the removal of his teeth. The dental disease was so widely scattered that he had to part with all his teeth. So great was the influence of this focal infection on the lungs, that after its removal, he gained rapidly in weight, with an equally astonishingly rapid improvement in the condition of his lungs.

The Cancer Problem

Cancers are *malignant tumors*. In order to understand the subject, it is well to study briefly the meaning of the words used. A tumor is an abnormal mass of tissue which results from an unnatural growth of some of the tissues of the body, appearing as a swelling or lump. All tumors are classed as either *benign* or *malignant*. The *malignant* tumors are much more serious, and tend to cause death if not removed. Their principal characteristic is that as they grow, they penetrate or infiltrate the tissues around them, and destroy these tissues; and often small fragments are carried to parts of the body more or less distant, and there develop into other tumors like the original cancer. The *benign* tumors do not grow in this way. The word "cancer" is commonly used to include all malignant tumors, though in the language of the doctors, it is used in a more limited sense. In this chapter, the word will be used to include all kinds of malignant tumors.

Cancer is a serious health problem, and actually a desperate problem in all civilized countries. Its frequency is rapidly and surely increasing. In the United States, in 1900, the deaths from cancer were 63 to 100,000 population; in 1917, they were 95 to 100,000, thus increasing at the rate of nearly two and a half per cent each year. At the present time, six per cent of all deaths are due to cancer. One writer of authority says:

"The mortality from cancer is no longer to be considered indifferently, for it constitutes a real menace to all civilized mankind. It is a self-evident duty on the part of all familiar with the facts to discuss the subject so that the public may be made aware of the dreadful truth. No harm is ever likely to come to any person by being unduly alarmed on this account. The harm and dreadful seriousness lie in ignorance and indifference to the supreme question as to how malignant disease can be controlled: how it can be prevented on the one hand, and how it can be successfully cured on the other."

CURABILITY

Cancer can be cured. Practically it can be cured in a large portion of the cases. The difficulty is that many cancers are not known to be present till they have grown to such an extent that they have become incurable, in that they may not be completely

removed. This is true of the deeper organs especially. But a greater and more deplorable difficulty is that many cancers which could easily be discovered and recognized at a sufficiently early time to be cured, are not recognized or are not treated, because of carelessness and ignorance. One of the chief causes of this neglect to treat them in the early and curable stages is the commonly accepted idea that all cancers are necessarily fatal and that it is therefore of no use to have them treated. Almost everyone knows of cases of cancer which are not cured. The knowledge of such cases becomes widespread. But few people know or hear of the many cases that are cured. Usually their scars are invisible, and the patients do not talk about their trouble after it is cured.

CAUSES

An immense amount of work has been done in efforts to discover the real causes of cancer, but comparatively little of a positive nature has been learned. Still, these investigations have resulted in the discovery of several important facts, and some previously held ideas have been definitely shown to be wrong. Following are some of the more important facts learned:

1. In human beings, *heredity* has no influence in the occurrence of cancer.

2. Cancer cannot be transmitted from one person to another. It is *not contagious*. A nurse or other person caring for a cancer patient is in no danger of taking the disease.

3. There is nothing to prove that cancer is caused by disease *germs* or *parasites* in the sense that the infectious diseases are caused by definite microorganisms.

4. Evidently the manner of living among civilized peoples must have some influence in the causation of the disease, since, so far as can be determined, it is much less frequent among peoples living under more primitive conditions, as the American Indians, native Africans, the Eskimos, and the grain-eating natives of China and India. It is reasonable to suppose that the abundance of food, the eating of much flesh food, the use of alcohol, tea, coffee, and tobacco, and the sedentary habits of the "civilized" nations, must be factors in producing this result.

5. Investigation has shown beyond question that long continued irritation or injury to the body tissues is prominent in determining the occurrence of cancer. Among the foremost examples of this, we may mention:

- a. Pipe-smoking as a cause of cancer of the lower lip. About eighty per cent of patients with cancer of the lip have had the

pipe-smoking habit. Only one woman to forty-nine men has cancer of the lip.

b. In Kashmir, the natives have the custom of wearing the Kangri basket, a receptacle holding burning charcoal, under the clothing, on the front of the body, for warmth. Frequent burns of the skin result, and these, in many cases, are followed by cancers. Cancers in similar locations are almost unknown except among these people.

c. Many natives of India and adjacent countries have the habit of holding in the mouth the so-called "chew," consisting of the betel nut, a piece of lime, and other materials. In many instances, this irritating mass causes cancer in the mouth of the user.

d. It is now known that the greater number of cancers of the stomach are preceded by ulcers in the stomach wall, in which the cancer starts to grow.

e. Among some Asiatic nations, where the social customs require that the men shall be served with food before the women can partake, with the result that the men get their food hot and the women take theirs cold, the men frequently have cancer of the throat and stomach, and the women very seldom. Without doubt, we in civilized countries should learn the lesson,—to avoid swallowing any food while it is very hot.

f. Practically all cancers of the gall bladder are preceded by gallstones in the gall bladder. Cancers in this location, however, are not very common.

PREVENTION AND CURE

The facts relating to the influence of the manner of life among civilized peoples on the occurrence of cancer emphasize the importance of personal hygiene in the prevention of cancer. This should include the lacto-vegetarian diet as preferable to a meat diet; a spare diet in the place of overeating; the avoidance of alcohol, tobacco, and condiments; and taking plenty of outdoor exercise instead of indoor indolence.

Yet these precautions are not sufficient, either in the prevention of cancer, or for a complete cure after a cancer appears. We should always be on the lookout, and especially in persons over thirty-five years of age, for the conditions which are liable to result in cancer, or for the earliest stages of actual cancerous conditions. All tumors, whether known to be cancerous or benign, should be completely removed at the earliest opportunity. Any

long continued sores on the skin or mucous membranes of the body openings should be removed by surgical means if they do not heal quickly by other means.

ORGANS AND PARTS AFFECTED

The most usual location of fatal cancers is the stomach. Among men, forty-four per cent of cancers causing death are located in the stomach and the liver; among women, thirty-one per cent are in these locations. Twenty-six per cent of all women dying of cancer die of cancer of the uterus (womb) and other generative organs, and eighteen per cent of cancer in the breast. Cancer of the skin is twice as common in men as in women, doubtless on account of the greater exposure of men to the effects of sunlight and to injuries of the skin. Cancer of the mouth, including the lips, is five times as frequent in men as in women, probably because of the greater use of tobacco, especially pipe-smoking, among men.

Notwithstanding the fact that there are more males than females in the general population, there are many more deaths from cancer among women—about sixty per cent as compared with forty per cent for men. The great frequency of cancers of the uterus and the breast in women accounts for this remarkable difference.

Table Showing Relative Proportion of Deaths Caused by Cancer in Different Organs of the Body

	Percentage of All Cancer Deaths
Mouth and Lips	3.7
Stomach	24.1
Liver and Gall Bladder	12.2
Intestines	12.1
Uterus (Womb)	14.1
Breast	9.1
Skin	3.6
All Other Parts	21.1
	<hr/> 100

From United States Census Report, 1919.

Stomach. Cancer of the stomach is somewhat more common in men than in women; but it is more common in women than is cancer in any other organ. Its onset is very difficult to recognize without special methods of examination. Some of the usual early symptoms are loss of appetite, and pain and discomfort in the region of the stomach. In the first stages, laboratory examination of the stomach contents, and X ray examinations, give the most reliable information. Prompt surgical operation, with removal of the part of the stomach containing the cancer, is the

only hope of cure. A large portion of the cases receiving this treatment in the early stages are cured.

Bowel and Rectum. Cancers of the bowel and rectum (the lower six or eight inches of the lower or large bowel) are less frequent than those of the stomach, but are relatively frequent. They do not spread so rapidly to other parts as do cancers of the stomach. An important effect of the presence of these tumors

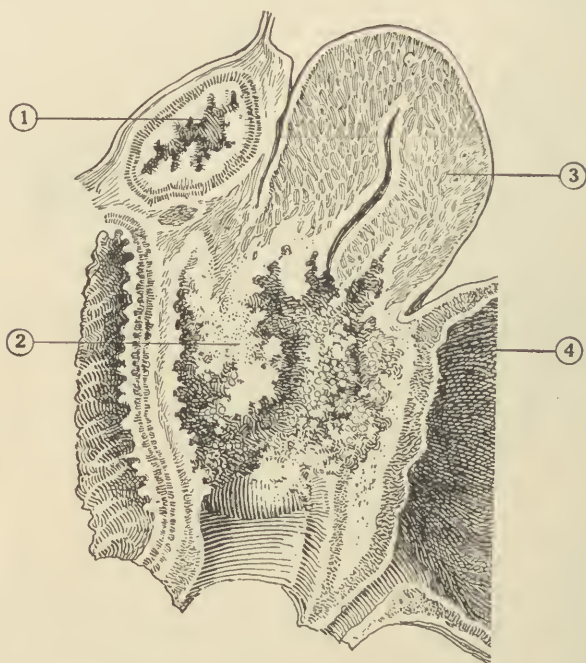


From MacCallum's "Pathology"
Cancer of the Stomach

is a partial or complete obstruction of the bowel. Among the first symptoms are pain and alternating attacks of constipation and diarrhea, and the passage of mucus and blood. Examination by a competent physician, often with the help of the X ray, will reveal the true state of affairs. Many cancers in the rectum are mistaken for hemorrhoids (piles), both by the patient and by the physician, unless a careful examination of the bowel is made by the physician. In order to have a chance of cure, it must be examined and removed by operation early in its progress. Even in incurable cases, temporary relief may be obtained by an artificial opening made into the bowel through the abdominal wall, or by so connecting the loops of the bowel as to make a passage around the obstruction caused by the tumor.

Uterus. About twenty-three per cent of all cancer deaths in women are from cancer of the uterus, or womb. Usually they do not occur before the age of thirty-five. There are two principal forms of these tumors. First are those of the cervix, or mouth,

of the womb. These are almost invariably seen in women who have borne children, the tears or scars caused by childbirth being the starting point of the cancer. This fact emphasizes the great importance of occasional examination of such scars by a capable physician, and, if they have been extensive, of having an opera-



CANCER OF THE WOMB (UTERUS)

1. Bladder
2. Cancer tissue

3. Body of the womb, or uterus
4. Section of the large intestine

tion for the removal of the scars or of the cervix at about the time when the childbearing period ceases. The early symptoms of this condition are an unnatural discharge, which may or may not be blood-tinged, and the appearance of blood after the cessation of the monthly periods at the time of the change of life. Either of these symptoms should call for thorough examination by a good physician.

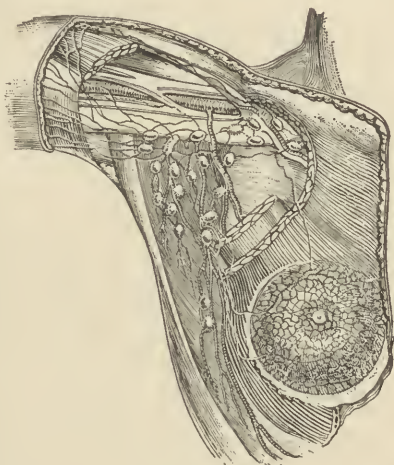
To effect a cure, an operation must be performed early in the disease, removing the uterus in practically all cases. In some cases where there can be no hope of complete recovery from the disease, on account of its having spread so far, some other

methods give temporary relief. Radium is very useful for this purpose.

The second form of cancer of the uterus is less frequent, and occurs in the lining membrane of the upper part of the body of the uterus. It does not spread as rapidly as the first form. The symptoms are somewhat similar to those already mentioned. The treatment is removal of the uterus by surgical operation. This measure is almost always successful when employed at all early in the course of the disease.

Breast. Cancer of the breast is very common in women. A similar condition is rarely seen in men. Inflammations and other disease conditions of the breast tissues, as well as benign or non-malignant tumors, are often the origin of the disease. It is very probable that hard blows upon the breast, causing injury of the tissues, may give rise to the condition. In their development, they are almost invariably painless, but can be felt as hard lumps in the breast tissue. Every lump in the breast which lasts for a number of weeks or more should be removed, as it is either a cancer or may be capable of becoming cancerous. About eighty per cent of all tumor masses in the breasts of women are found to be cancerous. (See color plate, page 30.) The only effective method of removal is by surgical operation. External applications will do no good; and rubbing or manipulation can do only harm, for if the tumor is cancerous, such treatment will serve to make it spread more rapidly to surrounding tissues or to distant parts of the body. As such a cancer develops, it will in many cases become attached to the skin, and a puckering or dimpling of the skin will appear. Often this is shown by a depression or pulling in of the nipple. When this stage is reached, the progress of its growth is quite advanced.

There are two ways to manage lumps in the breast, the right way and the wrong way. Even physicians may take the wrong



LYMPH NODES

The most frequent place of secondary tumors is the lymph nodes in the axillary region (armpit).

way; but generally the mistake is made by the patient in not going to the physician as soon as any well defined lump is noticed. The wrong way of handling such a condition is to "wait and see" whether or not it will grow and develop the unmistakable signs of cancer. After such signs are fully developed, it is usually too late for the treatment to produce a complete cure. The right way is to remove at once, by operation, every definite unnatural mass or lump in the breast. Examination of this removed tumor by an expert physician specially trained in this work will show whether or not it is cancerous. Nearly all cases of breast cancer treated in the early stages are cured by the operation. If they go on to later stages, they become incurable. The proper treatment of all cases of cancer of the breast consists in complete removal of all the breast, with certain other tissues in that region.

Another sign of the early stages of a less common form of breast cancer is the discharge of a bloody fluid from the nipple. This symptom should call for immediate attention from a physician.

Lips, Tongue, and Mouth. Cancers of the lip are confined almost entirely to the lower lip. They are located on the mucous membrane (the red, smooth portion), or at the line of junction of the skin and the mucous membrane. As mentioned before, they are much less common in women than in men, and unquestionably are due, in the majority of cases, to irritation from the use of a pipe. Every spot of thickened tissue, like a wart, and every sore (ulcer) that fails to heal after several weeks, should be examined by a physician, and ought to be cut out, and then examined under the microscope.

Cancer of the lip is very malignant, as a rule, and rapidly spreads to the lymph nodes located under the chin and the side of the jaw, which are closely connected by the lymph channels with the lip. (See color plate, page 30.) The spread of cancer to these nodes may take place as early as within two or three months from the time the tumor is first noticed; and to secure definite cure of cancer of the lip, an operation must be performed early, and usually must include a removal of these lymph nodes.

Cancers of the tongue and mouth are less common than those of the lower lip, but are even more dangerous. (See color plate, page 30.) The only cure is complete removal early in the progress of their growth.

Skin. Cancers of the skin are of very frequent occurrence, especially in men. The parts of the body surface where they oftenest occur are the face (particularly about the eyes and nose and ears and on the lower lip and the temples) and the hands and

feet. These cancers vary in malignancy, and are likely to be more malignant in certain locations than in others. The more malignant forms are especially liable to occur at the orifices of the body (as illustrated by those on the lower lip), also upon the hands and arms and the feet and legs. Many of the skin cancers in other locations, as on the eyelids or about the eyes and on the temples, grow very slowly, and are less malignant and more easily cured. All suspicious conditions should be examined and treated by a physician. The treatment consists of removal of the tumor, together with an area of healthy tissue around it. Some of the less malignant forms can be successfully treated by X ray or radium and by other means, but this should not be attempted except under the direction of the physician.

There is one form of cancer of the skin which requires special mention—the black or pigmented or melanotic cancer, which always originates from a pigmented or black mole, and may occur anywhere on the skin surface. These are so very malignant, and spread so rapidly to other parts of the body, that after they begin to grow and are recognized as cancers, they are scarcely ever cured. The only safe way to deal with these, therefore, is to have all moles that are liable to become cancerous removed *by a surgeon*. Only those which are rather large in size and considerably raised above the surface are in danger of this cancerous change. There should never be any tampering with these moles by the use of pastes, X ray, or electricity, but they should be completely cut out by mechanical means.

Some of the other regions of the body that are important as related to the occurrence of cancer are the thyroid gland, the larynx, the esophagus, the external genitalia, and the bones. For lack of space, these will not be discussed. Those of the bones are of a different type from the others, and are called *sarcomas* instead of *epithelial cancers*.

ESSENTIAL LESSONS

The essential lessons to be learned from this chapter are, to keep in mind the principal places in which cancer is likely to appear, and to consult a trustworthy physician for thorough examination and advice if any suspicious condition is observed; and with this, to keep in mind that cancers are curable, but in the majority of instances, only by complete removal early in the progress of the disease.

In recent years, the treatment of malignant disease by means of radium and X rays, which are very similar to each other in their nature and effects, has attracted much attention. Regarding these remedies, the following facts should be remembered:

1. The rays cannot be trusted to destroy wholly any but a few of the less malignant forms of cancer, especially some of the skin cancers in which there is no tendency to spread to the lymph nodes or other parts of the body. Whether a given tumor belongs to this class must be left to the judgment of the physician.

2. In the more deeply seated cancers and those in the internal organs, we cannot depend upon these rays for entire destruction of the tumor. If full cure is to be accomplished, it must be by mechanical removal of all the cancer tissue.

3. On the other hand, radium and X ray are of great value in the treatment of many cancers which are so extensive as to be incurable, or which, on account of their locations, cannot be safely removed. In these cases, the ray treatments will cause the cancer tissue to shrink and disappear to a considerable extent, and will give much relief, but do not assure complete recovery. This treatment is also often used in combination with surgical treatment, the rays being applied directly to the tissues where the tumor has been removed.

4. In conclusion, the importance of avoiding the advice or services of so-called "cancer doctors," "cancer specialists," and others of their class, must be emphasized. As a class, they are ignorant and do a great deal of harm. One of the worst results of their work is that it leads to delay in the adoption of essential measures until it is too late to effect a cure by any means.

The same caution applies to the use of any "cancer medicine" or "cancer cure," for there is no such thing. The only cure for cancer is full and actual destruction. The same warning applies also to all "rubbing doctors" or rubbing or manipulation treatments. They can do only harm.

General Index

- ABDOMEN**, dropsy of, 343
 of newborn baby, 651
 Abdominal fever, *see* Typhoid fever.
 massage, 154
 Abortions, 644
 Abscess, alveolar, 782
 apical, 784
 ischio-rectal, 329
 of liver, 349
 of lung, 471
 of rectum, 329
 of skin, 537
 Absence of acid, 311
 Acetanilide, 85
 antidote for, 220
 Acetic acid as a preservative, 279
 Acetyl-salicylic acid for tonsillitis, 480
 Achylia, *see* Absence of acid.
 Acid, absence of, 311
 Acne, *see* Pimples.
 Aeromegaly, 398
 Actinic quartz light for baldness, 562
 for psoriasis, 550
 for ringworm of scalp, 545
 Actinic ray for lupus erythematosus, 555
 for lupus vulgaris, 555
 for pimples, 536
 Acute bronchitis, medicated steam for, 164
 constipation with bilious headache, magnesium citrate for, 162
 gastritis with fermentation, bismuth for, 164
 intestinal indigestion, castor oil for, 162
 laryngitis, heating compress for, 133
 yellow atrophy, *see* Malignant jaundice.
 Addison's disease, 397
 Adenoids, 481, 580
 cause of acute earache, 481
 of chest deformities, 482
 of chronic catarrh of nose, 583
 of epilepsy, 418
 of migraine, 428
 of running from ear, 481
 Adiposo-genital dystrophy of Fröhlich, 399
 Adolescent insanity, 444
 Adrenal glands, 390, 394
 tuberculosis of, 397
 Adulteration of food, 277
 Advertising doctors, 97
 Aëration of blood, 353
 Afterbirth, 648
 Agar-agar, 162
 Aged, decrease in food requirement of, 263
 diet for, 263
 table showing average weight of, 263
 Agramonte, Aristides, 686
 Ague cage, 387
 Air, fresh, 69
 for tuberculosis, 509
 humidity of, 107
 importance of, 106
 impure, cause of chronic catarrh of nose, 583
 passages, diseases of, 489
 pure, for preventing infection, 694
 qualities of, needed, 107
 sacs, 457
 sea, 68
 sources of contamination of, 107
 Albumin in urine, 590
 Albuminuria, 645
 Alcohol, cause of bulging of artery, 370
 of chronic catarrh of nose, 583
 of epilepsy, 418
 of hardening of liver, 343
 of heart trouble, 362
 of high blood pressure, 367
 of insomnia, 424
 of neuritis, 412
 of psychasthenia, 416
 of sciatica, 411
 dangers of, 254
 effects of, on European nations, 83
 for poison ivy, 558
 for poison oak, 558
 rub, 138
 Alcoholism, cause of chronic pancreatitis, 350
 unconsciousness from, 208
 Aleppo boil, *see* Oriental sore.
 Alkaline bath, 144
 sponge, 138
 Alopecia, *see* Baldness.
 Alveolar abscess, 782
 Amenorrhæa, *see* Menstruation, absence of.
 American College of Surgeons, 169
 Amino acids, 241, 298

- Ammoniated mercury ointment for
 impetigo, 539
 for ringworm of beard, 546
 for ringworm of body, 545, 765
- Amœba, 56
- Amyl nitrite for bulging of artery,
 371
 for heart trouble, 366
- Amylopsin, 297
- Anæmia, 376, 378
 cause of absence of menstruation,
 628
 of blackheads, 533
 of insomnia, 424
 of ringing in ear, 577
 local, causes of, 377
 pernicious, 379
 predisposing cause of neuralgia,
 409
 primary splenic, 387
 result of fish tapeworm, 334
 secondary, 378
- Anæsthesia, discovery of, 168
- Analgesics, 163
- Anaphylaxis, 231
- Aneurism, *see* Artery, bulging of.
- Angina pectoris, 361
- Angioma, 374
- Aniline dyes for coloring food, 283
- Animals, odors from, cause of bron-
 chial asthma, 490
 prevalence of disease in, 289
- Ankle, bandaging of, 202
 tuberculosis of, 515
- Ankylosis, 521
- Annatto for coloring food, 283
- Anodynes, 709
- Anopheles mosquito, 46
- Antacids, 163
- Anthrax, 49
 vaccine, 50
- Antibodies, 57
- Antidiphtheritic serum, 42
- Antidote for acetanilide, 220
 for arsenic, 220
 for belladonna, 218
 for bichloride of mercury, 219
 for botulism, 226
 for carbolic acid, 217, 219
 for codeine, 221
 for corrosive sublimate, 219
 for fly poisons, 220
 for hydrochloric acid, 217
 for insect bites, 227
 for laudanum, 218, 221
 for lead poisoning, 218, 221
- Antidote — *continued.*
 for lysol, 219
 for morphine, 218, 221
 for mushroom poisoning, 224
 for naphtha poisoning, 218, 223
 for nitric acid, 217
 for opium, 218, 221
 for oxalic acid, 218
 for paregoric, 218, 221
 for Paris green, 220
 for phosphorus, 218, 220
 for poisoning from corn cures, 220
 from cough mixtures, 221
 from Fowler's solution, 220
 from headache powders, 220
 from infected foods, 225
 from matches, 220
 from nux vomica, 220
 from soothing sirups, 218, 221
 for prussic acid, 218
 for rat poisons, 220
 for silver nitrate, 218
 for snake bites, 227
 for spider bites, 227
 for strychnine, 218, 220
 for sulphuric acid, 217
 for wood alcohol, 218, 222
- Antipyretics, 511
- Antiseptic for sores, 164
 for ulcers, 164
- Antiseptics, 164
- Antitoxins, 57
- Antivaccination, 36
- Antivenom, 58
- Antivivisection, 39, 42, 44, 46
- Anus, itching, 329
- Aorta, 354, 356
 bulging of, 370
- Apoplexy, 371, 595
 cerebral, 371
 unconsciousness from, 208
- Appendicitis, 322, 785
 acute, 322
 necessity of surgery in, 171
 cause of Bright's disease, 593
 of sour stomach, 310
 chronic, 322
 germ of, 322
 interval operations for, 324
- Appendix, 322, 333
 infection in, cause of hyperthyroid-
 ism, 393
- Appetite, 237
 as a guide, 238
 failure to control, 239
 in sickness, 239

- Arch of foot, 528
 Arch supports, 530
 Argylol for conjunctivitis, 566
 for sore throat, 479
 for ulcer of cornea, 568
 Arm, bandaging of, 201
 bath, hot and cold, 140
 bleeding in, 195
 Arms of newborn baby, 651
 Arnica for bruises, 531
 Aromatic cascara, 162
 spirits of ammonia, 163
 Arsenic, antidote for, 220
 cause of neuritis, 412
 of secondary anæmia, 378
 Arsphenamine, 731
 Arterial tree, 356
 Arteries, coronary, hardening of, 361
 diseases of, 367
 hardening of, 367
 Arteriosclerosis, *see* Hardening of ar-
 teries.
 Artery, bulging of, 370
 pulmonary, 353
 radial, 358
 Arthritis, acute, 517•
 chronic, cause of headache, 427
 deformans, 519, 786, 790
 gonorrheal, 521
 predisposing cause of neuralgia,
 409
 tuberculous, 515
 Artificial respiration, Shaffer method
 of, 214
 Asexualism, 399
 Asiatic cholera, *see* Cholera.
 Asphyxia, *see* Gas suffocation.
 Aspirin for neuralgic pains, 163
 for tonsillitis, 480
 Asthma, 785
 bronchial, 490
 dry chest pack for, 132
 Atomizers, 165
 Atropine, for mushroom poisoning,
 225
 sulphate for iritis, 568
 Atwater, 286
 Auditory canal, 572
 external, infection of, 574
 Auricle, 572
 Auto-intoxication, cause of epilepsy,
 418
 sleep caused by, 71
 Autumnal fever, *see* Typhoid fever.
 Avebury, Lord, 689
 Avocation, 65
 Axilla, temperature by, 181
 Axon, 403
 BABY, amount at each feeding of,
 664
 artificial feeding of, 662
 bathing of, 656
 bed-wetting of, 676
 bronchitis of, 675
 care of ears of, 667
 of eyes of, 667
 of nose of, 667
 of privates of, 667
 chafing of, 676
 chart of normal weight of, 654
 clothing of, 657
 cold of, 674
 constipation of, 670
 convulsions of, 672
 development of sense of smell in,
 654
 diarrhea of, 673
 epilepsy of, 672
 feeding of, 659
 hearing of, 654
 hiccough of, 671
 incontinence of urine in, 676
 newborn, 650
 abdomen of, 651
 arms of, 651
 bowel discharges of, 652
 breathing of, 652
 care of, 648
 chest of, 651
 hips of, 651
 legs of, 651
 length of, 650
 shoulders of, 651
 tongue of, 651
 urine of, 652
 weight of, 650
 pneumonia of, 675
 sample formulas for feeding of,
 665
 sick, 668
 bowels of, 668
 poultices for, 669
 water-drinking for, 668
 teeth of, 656
 time of feeding of, 664
 walking of, 653
 weaning of, 662
 Back, massage of, 154
 Bacteria, cooking of meat to destroy,
 289
 Bacteriolysins, 57

- Bagdad boil, *see* Oriental sore.
- Baking soda for hives, 548
for insect bites on eyelids, 565
for itching of chicken pox, 710
- Balanitis, 738
- Baldness, 562
prescription for, 562
- Balsam for laryngitis, 484
of Peru for scabies, 541
- Bandage, moist abdominal, 133
- Bandaging of ankle, 202
of arm, 201
of foot, 202
of hand, 201
of knee, 203
of leg, 203
- Banti's disease, 387
- Barber's itch, *see* Ringworm of beard.
- Barrel chest, 482
- Bartholin, glands of, 619
- Bartholinitis, 619
- Bathing, 90
excessive, 91
in pregnancy, 643
of baby, 656
of patient, 184
- Baths, alkaline, 144
alternate hot and cold foot, 139
for congestive headache, 139
alternate hot and cold leg, 139
for varicose ulcers, 139
for varicose veins, 139
- Brand, 143
cold, 91, 143
for typhoid fever, 143
cold rubbing, 143
cold rubbing sitz, 141
for constipation, 141
for profuse flow, 141
electric light, 145
electric tub, 144
graduated, 143
for lowering fever temperature, 143
hot and cold arm, 140
hot foot, 138
hot, for poisoning from strychnine, 220
hot half, 142
hot leg, 139
hot sitz, 141
for inflamed rectum, 141
for ovarian neuralgia, 412
for painful menstruation, 141
for painful urination, 141
for pain in bladder, 141
- Baths, hot sitz — *continued.*
for pain of piles, 141
hot tub, 142
for convulsions, 142
medicated, 144
mustard foot, 138
Nauheim, 145
for heart disease, 145
neutral, 142
for insomnia, 143
for mania, 143
revulsive sitz, 142
for pelvic inflammation, 142
Russian, 145
saline, 144
sitz, 140
sun, 159
Turkish, 145
warm, 91
effect of, on nervous system, 91
- Bath water, disinfection of, 190
- Beard, ringworm of, 545
- Bed linen, soiled, disinfection of, 190
making, 175
- Bedpan, 182
- Bed-wetting of baby, 676
- Beef juices, 188
- Beef tapeworm, 333
treatment for, 340
- Belladonna, antidote for, 218
- Bellevue Hospital, 788
- Benefactors of mankind maligned, 33
- Beriberi, 754
cases of, in British army, 270
geographical distribution of, 755
- Beta-naphthol for scabies, 541
- Beverages, caffeine, 255
stimulating, 254
- Bichloride of mercury, danger in mis-
taking for drinking water, 187
for vaginitis, 619
- Bile, 296
- Bilharziosis, 765
geographical distribution of, 765
- Biliousness, 349
- Binder, moist abdominal, for insom-
nia, 425
- Binet-Simon test, 439
- Birth rate, diminishment of, 80
in England, 81
in France, 81
in United States, 81
- Bismuth for acute gastritis with fer-
mentation, 164
for diarrhea, 164

- Bismuth — *continued*.
 for vomiting, 164
 milk of, 164
- Black death, *see* Plague.
- Black eye, 564
- Blackheads, 90, 533
 prescription for, 534
- Black-water fever, 753
- Bladder, 592
 diseases of, 601
 stones in, 603
 tumors of, 602
- Blane, Sir Gilbert, 35
- Blanket, how to fold, 146
- “Bleeders,” 382
- Bleeding, 193
 from arm, 195
 from face, 195
 from foot, 195
 from head, 195
 from leg, 195
 from nose, 196
 from shoulder, 195
 from thigh, 195
- Blepharitis marginalis, *see* Eyelids,
 chronic inflammation of.
- Blood, 55
 aëration of, 353
 amount of, in body, 377
 carbohydrate material in normal,
 244
 clotting of, 377
 composition of, 376
 corpuseles, 55
 disease, *see* Syphilis.
 diseases of, 376
 disturbances of, 55
 effects of hot and cold water on,
 123
 elements of, 352
 in pregnancy, 635
 in urine, 591
 plasma, 55
 platelets, 377
 plates, 55
 poisoning, 719, 785
 cathartics for, 163
 purifier, 310
 structure of, 376
 vessel, rupture of, 371
 vessels, 77
 dilated, bunches of, on face, 374
- Body, belongs to God, 59
 louse, 542
 medium for development of mind
 and soul, 59
- resistance of, to disease, 677
 ringworm of, 545, 765
 table showing composition of, 257
- Boils, 537, 774, 786
 cause of acute osteomyelitis, 523
 of hand, 724
- Bomb calorimeter, 247
- Bones, affections of, 523
 pelvic, 597
 tuberculosis of, 501
 turbinate, 579
- Boric acid, for cellulitis, 723
 for conjunctivitis, 566
 for eye drop, 703
 for vaginitis, 619
- Botulism, antidote for, 226
- Bouchard, Professor, 71
- Bowel discharges of newborn baby,
 652
- Bowels, cancer of, 797
 care of bedfast patient's, 182
 fermentation in, 309
 in pregnancy, 642
 of sick baby, 668
- Brain, 403
 abscess, 431
 development, 408
 gray matter of, 404
 injury, unconsciousness from, 208
 seat of consciousness in, 406
 seat of intelligence in, 406
 syphilis, cause of epileptic fits, 418
 headache of, 427
 tumor, 434
 cause of epileptic fits, 418
 weight of, 403
 white matter of, 404
 worker, food for, 262
- Brand bath, 143
- Bread, poorly baked, cause of sour
 stomach, 310
- Breakbone fever, *see* Dengue.
- Breast, cancer of, 799
 diseases of, 621
 enlargement of, 636
 in pregnancy, 634, 643
 inflammation of, 622
 pump, 623
 tumors of, 623
 unnatural enlargement of, 623
- Breathing in pregnancy, 635
 of newborn baby, 652
- Bright's disease, 785, 789
 cause of eczema, 551
 of headache, 427
 of insomnia, 424

Bright's disease — *continued.*

of itching, 559

chronic, 594

hot blanket pack for, 150

statistics concerning, 79

urine in, 589

British Medical Research Committee,
268

Bromide of potash, 163

Bronchi, 53, 457, 460

Bronchial asthma, 490

Bronchitis, 489, 786

fomentations for, 129

of baby, 675

prescription for, 165

Broncho-pneumonia, 466

serum for, 467

Broussais, 67

Brown, Dr. Lawrason, 504, 508

Bruises, 165, 531

prescription for, 165

Bubonic plague, *see* Plague.

Bunions, 522

Burns, 193, 198

carron oil for, 199

prevention of, 199

simple remedies for, 199

sweet oil for, 199

Bursæ, 513

Bursitis, 515, 786

CACAO butter, 153

Cæcum, 297

Caisson disease, 235

Calabar swellings, 743

Caleuli, *see* Stones.

Calorie, definition of, 247

Camp, Walter, 68

Camphor, 163

Camphorated oil, 134

Cancer, 793

cause of baldness, 562

causes of, 794

cureability of, 793

cure of, 795

death rate from, 79, 793

epithelial, 801

in relation to meat eating, 290

to vegetarianism, 290

melanotic, 801

of bile ducts, cause of jaundice, 345

of bowels, 797

of breast, 799

of cervix, 618

of esophagus, 306

of lip, 800

of liver, 349

cause of jaundice, 345

of mouth, 800

of pancreas, 351

cause of chronic pancreatitis, 350

of rectum, 797

of skin, 800

X ray for, 161

of stomach, 796

cause of secondary anæmia, 378

of tongue, 800

of uterus, 797

prevention of, 795

table showing deaths from, 796

Cane sugar, action of invertase on,
297

dangers of excessive use of, 259

Canities, *see* Gray hair.

Cannon, Professor W. B., 395

Capillaries, 357

Carbohydrate material in blood in
diabetes, 244

in ordinary blood, 244

Carbohydrates, 244

digestion of, 244

salivary digestion of, 294

table of foods rich in, 245

Carbolic acid, antidote for, 217, 219

cause of Bright's disease, 593

Carbonic acid gas, 352

Carbuncles, 538, 774

cause of acute osteomyelitis, 523

of hand, 724

Caries, *see* Teeth, decay of.

Carotid artery, experiments on, 40

Carroll, James, 686

Carron oil for burns, 199

Carrot juice for coloring food, 283

Cartilages, 513

Cascara sagrada, 162

for chronic constipation, 162

Cases, contagious, care of, 190

Castor oil, 162

Casts in urine, 591

Cataract, 569, 774

Catarrh of nose, chronic, 582

Dobell's solution for, 165

prescription for, 165

of throat, Dobell's solution for, 165

prescription for, 165

Catarrhal jaundice, 346

Cathartics, 162

cause of constipation, 318

Cells, 53, 352, 376

ethmoid, 579

lymphoid, 383

- Cells — *continued*.
 mastoid, 572
 nerve, 403
 red blood, 55
 white blood, 53, 54, 55
- Cellulitis, 722, 786
- Cellulose, 244
- Cerebellum, 404
- Cerebrospinal meningitis, 785
- Cerebrum, 404
 lobes of, 405
- Cerumen, *see* Earwax, impacted.
- Cervical lacerations, 618
- Cervix, 609
 cancer of, 618
- Cesspool, 119
- Chafing, 560
 of baby, 676
 prescription for, 561
- Chalazion, 564
- Chancroid, 738
- Charcoal poultices, 134
- Charges of physician, 100
- Chart of balanced ration, 243
 height-weight, 260
 industrial classification, 440
 of fever in measles, 702
 of normal weight of baby, 654
 teething, 655
- Chaulmoogra oil, 752
- Chemical purification of water, 115
- Chemicals in water, 115
- Chest, 456
 in pregnancy, 635
 massage of, 154
 of newborn baby, 651
- Chicken pox, 709
 difference of, from smallpox, 708
- Chilblains, 228
 prescriptions for, 229
- Child, newborn, brain of, 408
 hemorrhagic diseases of, 382
- Childbirth, 634
 in absence of physician, 646
- Children, ataxic, 444
 dietetics for, 259
 eating habits of, 261
 paralytic, 444
 suggestions for feeding of, 261
- Chittenden, 274, 286
 standard, 249
- Chloral, 85
- Chlorate of potash for sore throat, 479
- Chloroform for foreign body in ear, 578
- Chlorosis, *see* Greensickness.
- Choate, Rufus, 69
- Cholangitis, *see* Catarrhal jaundice.
- Cholecystitis, *see* Gall bladder, inflammation of.
- Cholera, 762
 carried by flies, 691
 carriers, 764
 infantum, 673
 vaccination for, 764
- Chorea, *see* St. Vitus's dance.
- Chrysarobin ointment for psoriasis, 549
- Cilia, 53, 460
- Ciliated columnar epithelium, 53
- Circulation, massage for, 156
 physiology of, 352
 pulmonary, 354
- Cirrhosis, *see* Hardening of liver.
- Clap, *see* Gonorrhea.
- Cleft palate, 232
- Clergyman's sore throat, 477
 heating compress for, 133
- Climate, influence of, on food intake, 264
- Clothing, 93
 color of, 93
 cotton, 93
 in tropical countries, 770
 kind of, for prevention of sun-stroke, 211
 linen, 93
 of baby, 657
 sheep wool, 93
 silk, 93
 to protect whole body, 94
- Clotting of blood, 377
- Cloves as food, 255
- Coal oil, 134
- Cocaine, 85
- Coccygodynia, *see* Neuralgic pain in lower spine.
- Coccyx, injury of, 412
- Cochineal for coloring food, 283
- Cocoa, consumption of, 86
- Codeine, antidote for, 221
- Coffee, cause of fermentation, 310
 of headache, 428
 of heart trouble, 362
 of insomnia, 424
 of neuritis, 412
 consumption of, 86
 drug in, 255
- Cold cloth around the neck, 133, 479
 creams, 92
 mitten friction, 135

- Cold — *continued*.
 sore, 301
 towel rub, 136
- Colds, 580, 785
 cause of conjunctivitis, 565
 dry chest pack for, 132
 of baby, 674
 phototherapy for, 159
- Coleridge, 420
- Colic, 670
- Colitis, *see* Inflammation of colon.
- Colon, 586
 bacillus, 322
 infection in, cause of hyperthyroidism, 393
 inflammation of, 324
 diet for, 325
- Color of clothing, 93
- Coma, diabetic, 774
- Comedo, *see* Blackheads.
 extractor, 534
- Common names of temperature, 124
- Complexion improver, prescription for, 66
- Compound licorice powder, 163
- Compresses, 130
 heating, 131
 heating joint, 134
 for rheumatic fever, 134
 heating throat, 133
 for acute laryngitis, 133
 for clergyman's sore throat, 133
 for hoarseness, 133
 for pharyngitis, 133
 for quinsy, 133
 for sore throat, 133
 for tonsillitis, 133
 medicated, 134
 revulsive, 129
- Condensed milk for baby, 663
- Condiments, 255
 cause of fermentation, 310
 of sour stomach, 310
 effect of, on kidneys, 255
 on liver, 255
- Confinement, time of, 638
- Congenital syphilis, 80
- Congestion, hot leg pack for, 150
 massage for, 154
 of liver, 348
 pelvic, 400
- Conjunctivitis, 565
 gonorrheal, 566
- Consanguinity not cause of feeble-mindedness, 446
- Consciousness, seat of, in brain, 406
- Constipation, 316
 cascara sagrada for, 162
 cause of appendicitis, 322
 of blackheads, 533
 of chronic catarrh of nose, 583
 of displacement of uterus, 610
 of eczema, 551
 of piles, 328
 of sour stomach, 310
 of sty, 564
 cold rubbing sitz bath for, 141
 compound licorice powders for, 163
 cotton seed oil for, 321
 cure of, by correcting diet, 162
 diet for, 319
 hygienic treatment for, 321
 in pregnancy, 636
 massage for, 322
 medicinal treatment for, 321
 of baby, 670
 prescription for, 321
 spastic, cause of heart trouble, 362
- Constitutional diseases, 773
- Construction of house, 103
- Consumption, *see* Tuberculosis of lungs.
- Convalescent diet, 188
- Convulsions, hot tub bath for, 142
 of baby, 672
 of pregnancy, cause of high blood pressure, 368
 hot blanket pack for, 150
- Cooking a science, 252
- Copaiba for laryngitis, 484
- Copper sulphate for coloring food, 283
- Corn cures, antidote for poisoning from, 220
- Cornea, inflammation of, 785
 ulcer of, 567, 785
- Corns, 557
 prescription for, 557
- Coronary arteries, hardening of, 361
- Corpus callosum, 404
 luteum, 349
- Corpuscles, 376
- Corrosive sublimate, antidote for, 219
 for ringworm of scalp, 765
- Cottonseed oil for constipation, 321
- Coryza, *see* Colds.
- Cough, 460, 489
 fomentations for, 129
 mixtures, antidote for poisoning from, 221
 of tuberculosis, 511
 sirups, 489

Cows, tuberculosis in, 498
 Crab louse, 543
 Creatine, 287
 Creepy sensations, massage for, 154
 Creosote, as a preservative, 279
 Cretinism, 443
 Crimean War, 748
 Croton oil, 163
 Croup, 674
 dry chest pack for, 132
 Croupous pneumonia, *see* Lung fever.
 Cunningham, Professor, 75
 Curettage, 618
 Cystic mastitis, chronic, 624
 Cystitis, 601, 785
 Cystocele, 620
 Cystoscope, 596, 600, 601, 602, 603
 Cysts, ovarian, 615
 in kidney, 598

DANDRUFF, 536

Dandy fever, *see* Dengue.
 Deaf mutes, 82
 Deafness, cause of, 574
 chronic catarrhal, 786
 Death rate from cancer, 79
 Decay of teeth, 81
 Degeneracy, solution of problem of,
 88
 Delhi boil, *see* Oriental sore.
 Dementia præcox, 444
 Dendrites, 403
 Dengue, 688, 742
 geographical distribution of, 742
 Depierrie, 84
 Dermatitis, 541, 550
 Dermoid, *see* Ovarian cyst.
 De Vilbiss atomizer, 165
 Dew poison, 338
 Dhobie itch, 764
 Diabetes, 786
 carbohydrate material in blood in,
 244
 cause of baldness, 562
 of eczema, 551
 of iritis, 568
 of itching, 559
 of shingles, 414
 insipidus, urine in, 589
 mellitus, 773
 cause of headache, 427
 urine in, 589
 predisposing cause of neuralgia,
 409
 Diabetic coma, cathartics for, 163

Diaphragm, 456
 urogenital, 592
 Diarrhea, bismuth for, 164
 castor oil for, 162
 cause of appendicitis, 322
 of piles, 328
 of baby, 673
 of measles, 703
 result of absence of acid, 311
 severe, cause of rectal abscesses,
 329
 summer, 673
 Diet a Bible subject, 63
 errors in, cause of malignant jaun-
 dice, 345
 for aged, 263
 for beriberi, 756
 for blackheads, 534
 for boils, 538
 for Bright's disease, 594
 for bronchial asthma, 491
 for bronchitis, 490
 for catarrh of nose, 583
 for chicken pox, 710
 for colds, 581
 for convalescents, 188
 for cystitis, 602
 for diabetes, 775
 for diphtheria, 486
 for eczema, 552
 for epilepsy, 419
 for erysipelas, 718
 for German measles, 705
 for gout, 779
 for headache, 428
 for high blood pressure, 369
 for hives, 548
 for hysteria, 422
 for inflammation of the colon, 325
 for influenza, 473
 for Malta fever, 742
 for measles, 704
 for migraine, 429
 for nervous prostration, 415
 for neuritis, 413
 for obesity, 777
 for painful menstruation, 631
 for pimples, 535
 for plague, 761
 for psoriasis, 549
 for St. Vitus's dance, 417
 for scarlet fever, 701
 for shingles, 414
 for smallpox, 708
 for sour stomach, 311
 for sprue, 758

- Diet — *continued*.
 for syphilis, 730
 for tonsillitis, 480
 for tuberculosis, 508
 for tumors of uterus, 614
 for typhoid fever, 714
 for woman after childbirth, 649
 for yellow fever, 740
 ideal, 258
 in acute illnesses, 265
 in fevers, 188, 265
 in nutritional diseases, 266
 in pneumonia, 466
 in pregnancy, 640
 in sickness, 265
 lack of bulk in, cause of constipation, 316
 liquid, 188
 of nursing mother, 662
 physicians see value of, 252
 rules to prevent deficiency in, 276
 semisolid, 188
- Dietaries, national, table showing, 259
- Dietetic treatment for constipation, 319
- Dietetics, 251
 for children, 259
- Digestion, chronic disturbances of, 343
 disorders of, cause of itching anus, 329
 influence of mind on, 256
 of nervous system on, 299
 of carbohydrates, 244
 of protein, 242
 physiology of, 292
 salivary, 294
 value of massage to, 153
- Digestive disorders cause of appendicitis, 322
 disturbances cause of blackheads, 533
 heating trunk pack for, 152
- Digitalis for heart trouble, 366
- Dilatation of heart, 362
- Diminishing birth rate, 80
- Diphtheria, 484, 719
 carriers, 485
 cause of absence of menstruation, 628
 of Bright's disease, 593
 of broncho-pneumonia, 466
 of neuritis, 412
 of paralysis of throat muscles, 486
 Loeffler's solution for, 486
 of larynx, 486
 serum for, 484
 spasm of esophagus in, 306
 toll of, 42
- Discrete variola, 707
- Disease, contagious, definition of, 677
 infectious, definition of, 677
 prevalence of, in animals, 289
 rapid increase of, 75
 unwarranted optimism concerning, 75
- Diseases, bacterial, of skin, 533
 constitutional, 773
 of skin, 547
 contagious, 697
 infectious, prevention of, 694
 nervous, 409
 nutritional, 266
 of air passages, 489
 of arteries, 367
 of bladder, 601
 of blood, 376
 of breast, 621
 of ear, 572
 of esophagus, 301
 of eye, 563
 of female organs, 609
 of heart, 359
 of intestines, 316
 of joints, 513
 of kidneys, 593
 of liver, 343
 of lungs, 461
 of lymph glands, 383
 of male organs, 605
 of metabolism, 773
 of mouth, 301
 of nose, 579
 of pancreas, 343
 of pleura, 461
 of stomach, 309
 of throat, 477
 of veins, 367
 parasitic, of skin, 540
 tropical, 739, 753
- Disinfectants, 164
- Disinfection of bath water, 190
 of drinking water, 191
 of hands, 191
 of soiled bed linen, 190
 of stools, 190
 of urine, 190
- Dislocation, cause of neuritis, 412
 of elbow, 205
 of finger joint, 205
 of hip, 206

- Dislocation — *continued*.
 of jaw, 206
 of knee, 206
 of shoulder, 205
 Dislocations, 205
 Disposal of sewage, 116
 Distillation of water, 114
 Diverticula, 307
 Dizziness, 417
 Dobell's solution, 165, 479
 Doctors, advertising, 97
 Dog, carrier of tapeworm, 334
 Drawsheet, 175
 Dress in pregnancy, 638
 Dropsy, Epsom salts for, 162
 of abdomen, 343
 Drowning, unconsciousness from, 214
 Drug habit, 85
 Drugs for bronchial asthma, 491
 for insomnia, 425
 for whooping cough, 487
 Drumhead, 573
 Ductless glands, disorders of, 389
 Dundum fever, *see* Kala azar.
 Dunbar's serum, 483
 Duodenum, 296, 586
 Dust as carrier of disease, 678
 cause of chronic catarrh of nose, 583
 diseases, 233
 inhalation of, cause of bronchial asthma, 490
 Dwarf tapeworm, 334
 treatment for, 340
 Dysentery, 673
 carried by flies, 691
 Dysmenorrhea, *see* Menstruation, painful.
 Dyspepsia, 319
 cause of heart trouble, 362
 cause of sty, 564
 Dyspeptics, 82
- E**AR, discharge from, in scarlet fever, 700
 diseases of, 572
 foreign body in, 577
 gathering in, 575
 middle, chronic discharge from, 577
 ringing in, 577
 Earache drops, 166
 in scarlet fever, 700
 Eardrum, 572
 Ears, care of, in baby, 667
 infected, cause of iritis, 568
- Earwax, cause of ringing in ear, 577
 impacted, 574
 Eating between meals, cause of fermentation, 310
 on retiring, cause of insomnia, 424
 purpose of, 253
 rapid, cause of fermentation, 310
 simplicity in, 253
 Eechymosis, 515
 Eclampsia, *see* Convulsions of pregnancy.
 Eczema, 551
 chronic, 552
 erythematous, 551
 of skin of leg from varicose vein, 374
 papular, 551
 prescriptions for, 553
 pustular, 552
 rubrum, 552
 squamous, 552
 vesicular, 552
 Ehrlich, 41
 Elaterium, 163
 Elbow, dislocation of, 205
 tuberculosis of, 515
 Electric light bath, 145
 shock, unconsciousness from, 212
 tub bath, 144
 precaution in use of, 144
 Electricity for apoplexy, 372
 for disease, 157
 for gonorrheal arthritis, 521
 for high blood pressure, 370
 galvanic, for neuritis, 413
 Electrotherapy, 157
 for relief of pain, 158
 to induce sleep, 158
 Elephantiasis, 681, 743, 744, 786
 geographical distribution of, 744
 Embolism, 371
 Embolus, 371
 Emetics, 164
 Emotion, cause of heart trouble, 362
 Empyema, 471, 785
 Encephalitis, 430
 lethargica, 431
 Endocarditis, 359, 784, 787
 Endurance tests, 286
 Enemas, cause of constipation, 318
 Engel, 80
 Enlargement of heart, 362
 Enteric fever, *see* Typhoid fever.
 Enzymes, 295

- Epidemic cerebrospinal meningitis, 43
 dropsy, 756
 geographical distribution of, 756
- Epiglottitis, 460
- Epilepsy, 418
 of baby, 672
 spasm of esophagus in, 306
 unconsciousness from, 208
- Epileptics, 82
- Epinephrine for purpura, 381
- Epiphora, *see* Watery eye.
- Epithelial cancer, 801
- Epsom salts, 162
 for dropsy, 162
- Equipment for home treatment, 124
- Erepsin, 297
- Eruptions, 697
- Erysipelas, 717, 719, 786
 cause of baldness, 562
 of hand, 722
- Erysipeloid, 722
- Erythema multiforme, 786
 znodosum, 477, 786
- Eskimo, teeth of, 81
- Esophagus, cancer of, 306
 diseases of, 301
 foreign bodies in, 308
 narrowing of, 305
 pouches in, 307
 spasm of, 306
 ulcer of, 308
- Ether for poison ivy, 558
 for poison oak, 558
- Eustachian tubes, 477, 481, 572, 579
- Exercise, 68
 for preventing infection, 695
 in pregnancy, 641
 lack of, cause of constipation, 317
- Exophthalmic goiter, 393
- Exophthalmos, 393
- External skin, 52
- Eye, black, 165, 564
 diseases of, 563
 fomentations for, 129
 foreign body in, 570
 pink, 566
- Eyebrows, 54
- Eyelashes, 54
- Eyelids, chronic inflammation of, 563
 granulation of, 567
 insect bites on, 564
 margins inflamed, 785
 prescription for chronic inflammation of, 563
- Eyes, care of, in baby, 667
- Eyesight, faulty, 82
- Eyestrain, cause of epilepsy, 418
 of facial neuralgia, 410
 of migraine, 428
- F**ACE, bleeding from, 195
 chapped, prescription for, 165
 creams, 92
 ringworm of, 765
- Facial neuralgia, 409
- Fainting, unconsciousness from, 207
- Falling sickness, *see* Epilepsy.
- Fallopian tubes, 610
 infections of, 616
- Faradic battery, 157
 electricity, 157
- Fascia, 531
- Fat soluble A, 266
- Fatigue from influenza, 396
- Fats, 242
 action of bile in digestion of, 296
 of steapsin on, 297
 table of foods rich in, 244
- Fatty heart, 361
- Faulty hearing, 82
- Fear, 63
 cause of gray hair, 562
 effect of, on adrenal glands, 395
- Feeble-minded, 439
 crimes of, 448
 industrial classification chart of, 440
 sexual problems of, 447
 statistics concerning, 77
 training of, 446
- Feeble-mindedness, 436
 causes of, 444
- Feeding, artificial, of baby, 662
 of baby, 659
 of bedfast patient, 187
- Fees, division of, 101
- Feêt, 95
- Fehling's solution, 775
- Felon, 725
- Female organs, diseases of, 609
 gonorrheal inflammation of, 616
- Fermentation, cause of appendicitis, 322
 of itching anus, 329
 in bowels, 309
 cause of chronic catarrh of nose, 583
 in stomach, 309
 cause of chronic catarrh of nose, 583

- Fever, acute infectious, cause of psychasthenia, 416
 black-water, 753
 blister, *see* Cold sore.
 cause of insomnia, 424
 diet in, 188, 265
 glandular, 385, 786
 Japanese river, 693
 Malta, 740
 puerperal, 49
 relapsing, of Africa, 693
 rheumatic, 786
 Rocky Mountain spotted, 694
 scarlet, 697
 temperatures, lowered by graduated bath, 143
 transient, of infants, wet sheet pack for, 152
 typhoid, 712
 yellow, 739
- Fibromata, 616
- Filaria Bancrofti, 743
 loa, 743
 medinensis, 743
- Filariasis, 688, 743
- Filtration of water, 114
- Finger, infection of, 724
 joint, dislocation of, 205
- Finlay, Dr. Charles, 686
- Finsen, 159
- Fireplaces, open, 110
- Fish tapeworm, 334
 treatment for, 340
- Fisher, Irving, 286
- Fissure, 330
- Flat foot, 528
- Flaxseed poultices, 134
 for Bartholinitis, 619
 for boils, 538
- Fleas as carriers of plague, 688
 methods of combating, 688
- Flesh worms, *see* Blackheads.
- Flexner, Dr., 44
 serum, 430
- Floating kidney, 596
- Flooding, *see* Menstruation, excessive.
- Fly, 689
 as carrier of disease, 690
 development of, 689
 habits of, 689
 method of combating, 691
 poisons, antidote for, 220
 tsetse, 692
- Focal infection, 780
 dominant germ in, 783
- Fomentation, material of, 125
 medicated, 129
 renewal of, 128
 size of, 125
- Fomentations, 125
 for acute pancreatitis, 350
 for catarrhal jaundice, 346
 for congestion of liver, 348
 for constipation, 322
 for shingles, 414
 number of, 128
 precautions in giving, 128
 preparation of patient for, 125
 protection of bedding from, 125
 to eye, 129
 to joints, 129
 to kidneys, 129
 to spine, 129
 to throat, 129
 to upper chest, 129
 to wound, 129
- Fontanels, 651
- Food, absorption of, 298
 adulteration of, 277, 280
 adulterations, table of, 282
 amount of, needed daily, 258
 artificial coloring matter in, 283
 sweeteners of, 284
 as carrier of disease, 679
 basis for judging, 259
 care of, 252
 closet, 106
 definition of, 241
 elements, classes of, 241
 for the brain worker, 262
 freezing of, 278
 highly seasoned, effect of, on appetite, 237
 improperly cooked cause of sour stomach, 310
 in tropical countries, 768
 intake, influence of climate on, 264
 of season on, 264
 table showing allowance according to, 264
 meat an acid-forming, 288
 a putrefactive, 288
 misbranding of, 283
 physical methods of preservation of, 277
 poisoning, 223
 preparation of, 252
 preservation of, 277
 pure, for preventing infection, 695
 refrigeration of, 278
 serving of, to patient, 188

Foods -- *continued*.

- table showing amount of, needed daily by average child, 260
- too cold, cause of sour stomach, 310
- too hot, cause of sour stomach, 310
- values, comparative, from economic standpoint, table showing, 288
- measurement of, 247
- Foods, acid-forming, 253
- base-forming, 253
- chemical methods of preservation of, 279
- combination of, 253
- economic value of, 248
- favorable combinations of, 254
- infected, antidote for poisoning from, 225
- list of, containing vitamine products, 276
- overstimulating, cause of sour stomach, 310
- protective, 276
- spoiled, cause of fermentation, 310
- tabulation of common, 240
- unfavorable combinations of, 254
- Foot, bandaging of, 202
- bath, alternate hot and cold, 139
- alternate hot and cold, for congestive headache, 139
- hot, 138
- hot, for congestion of liver, 348
- mustard, 138
- bleeding in, 195
- itch, 338
- Forebrain, 404
- Foreign bodies in esophagus, 308
- materials, passing of, cause of rectal abscesses, 329
- Formaldehyde as a preservative, 279
- for fumigation, 191
- Fountain syringe, 184
- Fowler's solution, antidote for poisoning from, 220
- Fracture, unconsciousness after, 212
- Fractures, 193, 202
- Frambæsia, *see* Yaws.
- Freezing, unconsciousness from, 211
- French measles, *see* German measles.
- Fresh air, 69
- Friction, cold mitten, 135
- for congestion of liver, 349
- for heart disease, 208
- for shock, 212
- tonic, 135
- Frigidity, 400

- Frostbite, 230
- Fruit juices, use of, at meals, 256
- Fruits, lack of, cause of constipation, 316
- unripe, cause of fermentation, 310
- Full tub baths, 142
- Fumigation, 191
- formaldehyde for, 191
- sulphur fumes for, 191
- Funk, 266
- Funnel breast, 482
- Furuncle, *see* Boils.

- GALLEN, 398, 406
- Gall bladder, 296, 346
- infection in, 785
- cause of hyperthyroidism, 393
- inflammation of, 347
- cause of sour stomach, 310
- Gallstones, 785
- cause of sour stomach, 310
- hydrotherapy for, 347
- in bile duct, cause of jaundice, 345
- Galvanic electricity, 157
- Gangrene, 774
- Gangrenous sore mouth, 303
- Gas formation, heating trunk pack for, 152
- heaters, 110
- poisoning, cause of abortion, 644
- suffocation, 213
- Gasserian ganglion, 410
- Gastralgia, 312
- Gastric juice, 53
- lipase, 296
- Gaucher's disease, 387
- General sanitation, 51
- Genitals, care of, in pregnancy, 643
- German measles, 704
- quarantine for, 705
- German Plague Commission, 688
- Germicides, 164
- Giantism, 398
- Ginger as food, 255
- Gladstone, William Ewart, 69
- Gland enlargements, diseases from, 82
- pineal, 390
- pituitary, 390, 397
- thymus, 383, 390
- thyroid, 390
- Glands, adrenal, 390, 394
- disturbance of, cause of headache, 428
- ductless, disorders of, 389
- effect of hot and cold water on, 123

Glands — *continued.*

- interstitial, 608
 - lymph, 54
 - diseases of, 383
 - of Bartholin, 619
 - of internal secretion, 389
 - of Montgomery, 634
 - oil, 580
 - parathyroid, 390
 - parotid, 710
 - prostate, 606
 - salivary, 294
 - sebaceous, 536
 - sex, 390, 399
 - solitary, 53
 - sublingual, 710
 - submaxillary, 710
 - suprarenal, 586
 - swcat, 580
 - swelling of, 54
 - tuberculosis of, 385
- Glossitis, *see* Acute inflammation of tongue.
- Glycerin for impacted earwax, 574
- for parched mouth, 182
- Glycogen, 395
- Glycethymoline, 165
- Goat's milk for baby, 663
- Goddard, Dr. H. H., 440
- Goiter, 391
 - districts, 394
 - exophthalmic, 393, 773
- Goldberger, 273
- Gonads, 399
- Gonorrhea, 731, 786
 - cause of blindness, 735
 - of cystitis, 733
 - of iritis, 568
 - of vulvitis, 618
 - in children, 735
 - in female, 733
 - in male, 733
 - relation of, to marriage, 737
- Gonorrheal arthritis, 521, 736
 - rheumatism, *see* Gonorrheal arthritis.
 - salpingitis, 616
- Gout, 773, 778
- Graduated baths, 143
 - for lowering fever temperature, 143
- Granulation of the eyelids, 567
- Gray hair, 561
- Great white plague, 493

- Greensickness, 379
 - cause of absence of menstruation, 628
- Grippe, *see* Influenza.
- Ground itch, 338
- Guaiacol as a preservative, 279
- Guinea worm, 743
- Gunshot wounds, 197

HABIT spasm, 426

- Habits, 408
- Hæmaturia, *see* Blood in urine.
- Hæmoglobin, 377, 459.
- Hæmophilia, *see* "Bleeders."
- Hair, 54
 - care of bedfast patient's, 182
 - dyes, 562
 - follicle, 537
- Hallux valgus, 522
- Hand, bandaging of, 201
 - boils of, 724
 - carbuncles of, 724
 - erysipelas of, 722
 - infection of joints of, 725
 - infections of, 722
- Hands, chapped, prescription for, 165
 - disinfection of, 191
- Hardening of arteries, 367
 - mortality from, 77
 - of liver, 343
- Harelip, 232
- Harvard University, 395
- Hay fever, 482
 - cause of bronchial asthma, 483, 490
 - of chronic catarrh of nose, 583
 - of conjunctivitis, 565
 - Dunbar's serum for, 483
- Head, bleeding from, 195
 - louse, 542
 - lousiness of, 542
 - massage of, 154
- Headache, 426
 - congestive, alternate hot and cold
 - foot bath for, 139
 - extracranial, 427
 - intracranial, 426
 - nervous, massage for, 155
 - powders, antidote for poisoning
 - from, 220
 - toxic, 786
- Health, a priceless treasure, 59
 - definition of, 61
- Hearing, center for, in brain, 407
 - faulty, 82
 - of baby, 654
 - tests for, 573

- Heart, 77, 353
arteriosclerotic group of diseases
of, 361
dilatation of, 362
disease, cold mitten friction for,
208
Nauheim baths for, 145
statistics concerning increase of,
77
unconsciousness from, 207
diseases of, 359
drugs for, 366
enlargement of, 362
failure, 595
fatty, 361
functional group of diseases of, 362
high blood pressure group of dis-
eases of, 361
in pregnancy, 635
inflammation of coverings of, 359
inflammation of lining of, 359
palpitation of, 362
rapid, 362
rheumatic group of diseases of,
359
syphilitic group of diseases of, 361
trouble, probable outcome of, 363
treatment of, 364
- Heartbeats, 354
- Heartburn, *see* Sour stomach.
- Heat exhaustion, unconsciousness
from, 209
- Heating compresses, 131
- Height-weight chart, 260
- Helmet for prevention of sunstroke,
211
- Hemorrhage, 194
from lungs, 196
from stomach, 196
from uterus, 617
how to recognize, 381
into skin, 381
- Hemorrhoids, *see* Piles.
- Hereditary syphilis, 80
- Hernia, 232
strangulated, 232
- Herpes, 738
labialis, *see* Cold sore.
zoster, *see* Shingles.
- Hiccough, 233
of baby, 671
- High blood pressure, 367
cause of insomnia, 424
cause of ringing in ear, 577
heels, 95
“High stomach,” 639
- Hill diarrhea, *see* Sprue.
- Hilus, 586
- Hip, dislocation of, 206
joint, tuberculosis of, 515
disease, *see* Tuberculosis of hip
joint.
- Hips of newborn baby, 651
- History of medical science, 33
- Hives, 547, 786
prescriptions for, 548
- Hoarseness, heating compress for, 133
- Hodgkin's disease, 385
- Hoffman, Frederick L., 76
- Holt, Dr., 81
- Home treatments, equipment for, 124
- Hookworms, 336
cause of secondary anæmia, 378
treatment for, 341
- Hormones, 389
- Horse-radish as food, 255
- Hospital, standardization, 170
- Hot-air furnace, 110
- Hot blanket packs, 146
half bath, 142
sitz baths for inflamed rectum, 141
for pain in bladder, 141
for painful menstruation, 141
- Hot-water radiators, 111
- House, bathroom in, 104
construction of, 103
fire menace to, 105
fireplace in, 110
floor of, 103
food closet in, 106
gas heaters in, 110
heating of, 109
hot-air furnace in, 110
hot-water radiators in, 111
in tropical countries, 767
kitchen in, 105
lighting of, 103
location of, 102
medicine cupboard in, 104
oil heater in, 110
refrigerator in, 105
rooms of, 103
screens on, 104
steam radiators in, 111
toilet of, 104
ventilation of, 108
window space in, 103
- Howell, 406
- Huber, 66, 73
- Hughes, Charles E., Jr., 44
- Hunger, 236
pains, 237

- Hydatid cysts, 334
treatment for, 340
- Hydrocele, 605
- Hydrocephalus, 442
- Hydrochloric acid, 53
antidote for, 217
germ destroyer, 53
in stomach, 296
lack of, in gastric secretion, 311
- Hydrophobia, discovery of cure for, 50
- Hydrotherapy, 121
for acute bronchitis, 489
for arthritis deformans, 521
for black-water fever, 754
for Bright's disease, 594
for bronchial asthma, 491
for cellulitis, 723
for cholera, 763
for chronic bronchitis, 490
for colds, 582
for dengue, 743
for diphtheria, 485
for erysipelas, 718
for fevers, 123
for gastralgia, 312
for gonorrheal arthritis, 521
for heart trouble, 366
for high blood pressure, 369
for influenza, 474
for influenzal pneumonia, 474
for insomnia, 425
for laryngitis, 483
for mastoiditis, 576
for measles, 703
for myalgia, 531
for nervous prostration, 415
for Oriental sore, 766
for piles, 329
for pleurisy, 469
for psychasthenia, 416
for rheumatism, 518
for scarlet fever, 700
for smallpox, 708
for spasm of esophagus, 307
for sprue, 759
for throat trouble, 480
for typhoid fever, 714
for vaginitis, 619
for yellow fever, 740
- Hyperacidity, *see* Sour stomach.
- Hyperadrenia, 397
- Hyperæmia, 377
- Hyperovarism, 401
- Hyperthyroidism, 392
- Hypertrophic endometritis, 618
- Hypnotics, 163
- Hypoadrenia, 396
- Hypopituitarism, 399
- Hypothyroidism, 392
- Hysteria, 420
neuralgic pain in lower spine in, 412
unconsciousness from, 216
urine in, 589
- I**CE bags, 130
caps, 130
- Ichthyol for chicken pox, 710
for lupus erythematosus, 555
- Idiosyncrasies in individuals, 231
- Idiot savants, 444
- Idiots, 439
- Ileocæcal valve, 298
- Ileum, 297
- Illness, acute, diet in, 265
- Imbeciles, 439
Mongolian, 443
moral, 442
statistics concerning, 77
- Immunity, 55
from tuberculosis, 495
of certain races, 56
- Impaction, 304
- Impetigo, 539
- Impotence, 608, 774
- Incontinence of urine, 603
- Increase of insanity, 76
- Indican in urine, 591
- Indigestion, 309, 319
cause of eczema, 551
of heart trouble, 362
of insomnia, 424
- Industrial classification chart, 440
- Infantile scurvy, 273
paralysis, 431
- Infection, 194
acute, cause of weakening of heart muscle, 365
focal, 780
modes of, 677
sources of, 677, 786
- Inflamed rectum, hot sitz baths for, 141
- Inflammation, acute, of tongue, 303
chronic, massage for, 156
of colon, 324
of mouth, 302
of pelvic organs, hot leg pack for, 150

- Influenza, 471
 cause of broncho-pneumonia, 466
 of chronic catarrh of nose, 583
 of conjunctivitis, 565
 of fatigue, 396
 of gathering in ear, 575
 of mastoiditis, 576
 of neuritis, 412
 of weakening of heart muscle, 365
 dry chest pack for, 132
 immunity from, 473
 medicine for, 474
 pneumonia jacket for, 473
 Influenzal-pneumonia, 474
 Inorganic salts, 245
 Insane, care of, 452
 commitment of, to state hospital, 455
 general paralysis of, 433
 Insanity, 449
 acute, 785
 cause of insomnia, 424
 causes of, 449
 increase of, 76
 Insect bites, antidote for, 227
 on eyelids, 564
 Insects as carriers of disease, 681
 Insomnia, 72, 423
 neutral bath for, 143
 wet sheet pack for, 151
 Intelligence, average, 437
 definition of, 436
 measurement of, 439
 seat of, in brain, 406
 tests, 441
 taking of, 442
 Intercostal neuralgia, 410
 Internal organs, effect of hot and cold water on, 123
 skin, 52
 Interstitial glands, 608
 Intertrigo, *see* Chafing.
 Intestinal colic, castor oil for, 162
 obstruction, acute, necessity of surgery in, 171
 parasites cause of epilepsy, 418
 worms, 331
 Intestines, 297
 diseases of, 316
 Intussusception, 327
 Invertase, 297
 Iodine compounds for goiter, 394
 for ringworm of scalp, 765
 Iris, inflammation of, 568
 Iritis, 568, 785
 Ischiorectal abscess, 329
 Itch, foot, 338
 ground, 338
 mite, 540
 toe, 338
 water, 338
 Itching, 559, 774
 anus, 329
 prescriptions for, 559
- J**ACOBI, DR. ABRAHAM, 70
 Jalap, 163
 Jaundice, 344
 catarrhal, 346
 hæmatolytic, 387
 malignant, 345
 mild, 343
 prescription for itching of, 345
 Jaw, dislocation of, 206
 Jejunum, 297
 Jenner, Edward, 33
 Jobling, Dr., 44
 Joints, diseases of, 513
 fomentation for, 129
 swollen, massage for, 156
 tuberculosis of, 501
Journal of the Outdoor Life, 510
- K**ALA azar, 759
 infantile, 760
 Keen, Dr. W. W., 38, 44
 "Kernels" under the skin, 384
 Kidney, cysts in, 598
 disease, cause of displacement of uterus, 610
 chronic, cause of heart trouble, 361
 floating, 596
 pelvis of, 587
 stones in, 598
 tuberculosis of, 501
 tumors of, 598
 weight of, 587
 Kidneys, 586
 blood supply of, 587
 diseases of, 593
 effect of condiments on, 255
 external appearance of, 587
 fomentations for, 129
 in pregnancy, 642
 internal structure of, 587
 nerve supply of, 587
 size of, 587
 support of, 586
 Kitasato, 42

- Kitchen, 105
 - in tropical countries, 769
- Kleptomania in pregnancy, 636
- Knee, bandaging of, 203
 - dislocation of, 206
 - tuberculosis of, 515
- Kneecap, floating, 513
- Koch, Dr. Robert, 45, 681
- Koplik's spots, 702
- L**ABOR, table showing calories
 - needed for different kinds of, 261
- Laborers, food for, 261
- Lacerations, cervical, 618
 - neglect of, cause of constipation, 317
 - of perineum, 619
 - unrepaired, cause of piles, 328
- Lactase, 297
- Lactation, menstruation during, 627
- Lacto-vegetarian dietary, 285
- La grippe, *see* Influenza.
- Laryngitis, 483
- Latty, Bishop, 83
- Laudanum, antidote for, 218, 221
- Laveran, 46, 681
- Lavoris, 165
- Lazear, Jesse W., 686
- Lead poisoning, antidote for, 218, 221
 - cause of abortion, 644
 - of bulging of artery, 370
 - of hardening of arteries, 367
 - of high blood pressure, 367
 - of neuritis, 412
 - of secondary anæmia, 378
 - prevention of, 221
- Leg, bandaging of, 203
 - bath, hot, 139
 - alternate hot and cold, 139
 - alternate hot and cold, for varicose ulcers, 139
 - alternate hot and cold, for varicose veins, 139
 - bleeding in, 195
- Legs of newborn baby, 651
- Leishmaniosis, *see* Kala azar.
- Lelan, Major, 691
- Leprosy, 750
 - geographical distribution of, 750
- Leucocytes, 55, 57
- Leucocythæmia, 380
- Leucocytosis, 57, 377
- Leucorrhea, 618
- Leukæmia, 380
 - lymphatic, 386
 - myelogenic, 386
- Life, high-tension, cause of heart trouble, 362
 - out-of-door, 67
- Ligaments, 513
- Limbs, massage of, 154
- Lip, cancer of, 800
- Lips, chapped, prescription for, 165
- Liquors, spirituous, cause of sour stomach, 310
- Lister, Lord, 40, 167
- Listerine, 165
- Little's disease, 444
- Liver, 296, 586
 - abscesses of, 349
 - acute yellow atrophy of, 785
 - cancer of, 349
 - congestion of, 348
 - diseases of, 343
 - effect of condiments on, 255
 - hardening of, 343
 - tropical abscess of, 349
- Lobar pneumonia, *see* Lung fever.
- Location of house, 102
- Lockjaw, false theories regarding, 42
 - germ of, 42
- Locomotor ataxia, 432, 786
 - cause of incontinence of urine, 604
- Loeffler's solution for diphtheria, 486
- Logwood for coloring food, 283
- Longevity, 75
 - average, 61
 - Bible on, 61
 - statistics concerning, 75
- Louse, body, 694
- Lousiness, 541
 - of body, 542
 - of head, 542
 - of pubic region, 543
 - prevention of, 543
- Lues, *see* Syphilis.
- Lumbago, 786
 - fomentations for, 129
- Lung congestions, fomentations for, 129
 - fever, 461
- Lungs, 457
 - abscess of, 471
 - diseases of, 461
 - hemorrhage from, 196
 - in pregnancy, 635
 - tuberculosis of, 502
 - value of massage in stimulating, 153

- Lupus, cause of baldness, 562
 erythematosus, 555
 prescription for, 555
 vulgaris, 554
 prescription for, 554
- Lusk, Dr., 258
- Lymph glands, 54, 580
 diseases of, 383
 enlargement of, 384
 inflamed, pouches in esophagus
 caused by, 307
 tuberculosis of, 500
- Lymph nodes, 54, 383
 overgrowth of, 380
 swollen, 384
- Lymphatic leukæmia, 386
- Lymphocytes, 54, 383
- Lymphoma, simple, 386
- Lymphosarcoma, 386
- Lysol, antidote for, 219
 for infection of external auditory canal, 574
- M**ACAULAY, 35
- Macrocephalism, 442
- Madura foot, 746
 geographical distribution of, 747
- Magnesium citrate, 162
 for acute constipation with bilious headache, 162
- Malaria, 46, 681, 682
 cause of Bright's disease, 593
 of enlargement of spleen, 387
 of neuralgia, 409
 of shingles, 414
 methods of combating, 684
 parasite of, 46
- Male organs, diseases of, 605
- Malignant growths, X ray for, 161
 jaundice, 345
- Malocclusion, 304
- Malta fever, 740
 geographical distribution of, 741
- Maltase, 294, 297
- Maltose, action of maltase on, 297
- Man as carrier of disease, 680, 716
- Mania, neutral bath for, 143
 wet sheet pack for, 151
- Manson, Dr. Patrick, 48, 681, 682
 Dr. Thurburn, 48
- Marriage, relation of, to gonorrhea, 737
- "Mask of pregnancy," 635
- Massage, 92, 153
 abdominal, 154
 facial, effect of, on skin, 92
 for arthritis deformans, 521
 for baldness, 562
 for chronic inflammations, 156
 for circulation, 156
 for congestions, 154
 for constipation, 322
 for creepy sensations, 154
 for gonorrhæal arthritis, 521
 for inducing sleep, 154
 for nerve irritations, 154
 for nervous headaches, 155
 for neuralgia, 155
 for neuritis, 413
 for numbness, 154
 for paralysis, 156
 for psychasthenia, 416
 for rheumatic pain, 156
 for St. Vitus's dance, 417
 for sprains, 156, 515
 for strengthening of respiration, 156
 for swellings, 154
 for swollen joints, 156
 for tinglings, 154
 in pregnancy, 641
 length of, 153
 movements in, 154
 of back, 154
 of chest, 154
 of head, 154
 of limbs, 154
 tonic effect of, 156
 value of, in case of wound, 153
 in improving nutrition, 153
 in stimulating lungs, 153
 to digestion, 153
- Mastication, 293
- Mastitis, acute, *see* Breast, inflammation of.
- Mastoid infection, acute, necessity of surgery in, 171
- Mastoiditis, 576
- Matches, antidote for poisoning from, 220
- Mayo Clinic, 789, 791
- McCullum, 238, 266, 276
- Meals, number of, 256
 time of, 256
 use of liquids at, 256
- Measles, 701
 cause of Bright's disease, 593
 of broncho-pneumonia, 466, 703
 of conjunctivitis, 565
 of eye disease, 703
 of heart trouble, 703
 of middle ear abscesses, 703

- Measles — *continued*.
 cause of mouth trouble, 703
 of tuberculosis, 703
 German, 704
 inflammation of mouth in, 302
 quarantine for, 704
 spasm of esophagus in, 306
- Meat, a putrefactive food, 288
 a stimulant, 287
 a substitute for nuts, 287
 an acid-forming food, 288
 an unfavorable food, 258
 cooking of, to destroy bacteria, 289
 eating in relation to cancer, 290
 extracts, 188
 not necessary, 291
- Meatus, inferior, 579
 middle, 579
 superior, 579
- Medical supplies, list of, for home,
 166
- Medicated bath, 144
 compress, 134
 fomentation, 129
 steam, 164
 for acute bronchitis, 164
 for whooping cough, 488
- Medicine, care in administration of,
 187
 cupboard, 104
- Medicines, patent, 85
- Mediterranean fever, *see* Malta fever.
- Medulla oblongata, 404
- Melæna neonatorum, 382
- Melancholia, 90
- Melanotic cancer, 801
- Melitensis, *see* Malta fever.
- Membranous croup, 486
- Memory, seat of, in brain, 407
- Meningismus, 429
- Meningitis, 43, 429
 cause of arrested development, 446
 of headache, 427
 epidemic, 430
 mortality from, 43
 tubercular, 430
- Menopause, 632
 duration of, 633
- Menorrhagia, *see* Menstruation, ex-
 cessive.
- Menses, *see* Menstruation.
- Menstrual disorders, cause of hys-
 teria, 420
 flow, *see* Menstruation.
- Menstruation, absence of, 399, 400,
 628
 cessation of, 636
 disorders of, 625
 disturbances of, cause of migraine,
 428
 excessive, 400, 629
 frequency of, 626
 length of time of, 627
 normal, 626
 painful, 400, 630
 precocious, 632
 vicarious, 632
- Mental excitement, cause of heart
 trouble, 362
- Menthol for hives, 548
 for laryngitis, 484
- Menus to illustrate balanced ration,
 249
- Mercury, bichloride of, antidote for,
 219
 cause of neuritis, 412
 of secondary anæmia, 378
 vapor quartz lamp, for neuritis, 159
 for sciatica, 159
- Metabolism, 389, 773
 diseases of, 773
- Metchnikoff, 41, 56
- Microcephalism, 442
- Mid-brain, 404
- Migraine, 428
- Milk as a carrier of disease, 679
 constituents of, 664
 infected, cause of typhoid fever,
 716
 leg, *see* Puerperal infection.
 of magnesia, 162
 Pasteurization of, 498
 sugar, action of lactase on, 297
 table showing composition of, 248
- Mind, limitations of, 438
- Miscarriage, cause of displacement
 of uterus, 610
- Mitchell, Weir, 69
- Mites, 693
- Moebries, 420
- Moist abdominal bandage, 133
- Mongolianism, 442
- Montgomery, glands of, 634
- Monthly flow, *see* Menstruation.
- Morning sickness, 636
- Morons, 439
- Morphine, antidote for, 218, 221
 for gallstones, 347
 for heart trouble, 366
- Morrow, Dr. Prince, 80
- Mortality from tuberculosis, 79
- Morton, W. F. G., 168
- Moses, 33, 61

- Mosquito, *Anopheles*, 46, 682
 habits of, 684
 Culex, 742
 Stegomyia, 686
 methods of combating, 687
 Mosquitoes as carriers of malaria, 682
 of yellow fever, 686
 Mountain sickness, 234
 Mouth, cancer of, 800
 care of patient's, 181
 disease of, 301
 gangrenous sore, 303
 inflammation of, 302
 parched, glycerin for, 182
 washes, 165
 Mouth-breathing, cause of mental dullness, 482
 of poor health, 482
 Mucous membrane, 52
 Mumps, 710, 785
 cause of deafness, 711
 of heart trouble, 711
 of inflammation of breast, 711
 of inflammation of ovaries, 711
 of inflammation of testicles, 608, 711
 of meningitis, 711
 of pneumonia, 711
 quarantine for, 711
 Muscarine, 224
 Muscle, psoas, 317
 Muscles, affections of, 523
 Mushrooms, antidote for poisoning from, 224
 Mustard as an emetic, 164
 as food, 255
 cause of fermentation, 310
 foot bath, 138
 plaster for shingles, 414
 stupe, 129
 Myalgia, 531
 Mycetoma, *see* Madura foot.
 Myelitis, transverse, cause of incontinence of urine, 604
 Myelogenic leukæmia, 386
 Myocarditis, 359, 785
 Myxædema, 392

NÆVUS, 374
 Nail inflammation, 230
 Nails, 54
 Naphtha, antidote for, 218
 poisoning, antidote for, 223
 Naphthalene for lousiness, 543
 Nasal polypi, cause of migraine, 428

 National Malaria Committee, 686
 Tuberculosis Association, 500, 510
 Nature's warnings, heedlessness of, cause of constipation, 316
 Nauheim bath, 145
 for heart disease, 145
 Neisser, 731
 Neo-arsphenamine, 731
 Neosalvarsan, 731
 for relapsing fever, 749
 Nephritis, *see* Bright's disease.
 Neptune girdle, *see* Binder, moist abdominal.
 Nerve cells, 403, 459
 irritation, massage for, 154
 sacral, 412
 sciatic, 411
 tissue, 403
 "Nerves," 319
 Nervous diseases, 409
 prostration, 400, 414, 785
 cause of insomnia, 424
 neuralgic pain in lower spine in, 412
 system in pregnancy, 636
 influence of, on digestion, 299
 physiology of, 402
 syphilis of, 432
 Nervousness, cause of fermentation, 310
 of ringing in ear, 577
 Neuralgia, 409
 cause of gray hair, 562
 facial, 409
 intercostal, 410
 massage for, 155
 ovarian, 412
 Neuralgic pain in lower spine, 412
 aspirin for, 163
 Neurasthenia, *see* Nervous prostration.
 Neurasthenics, 449
 Neuritis, 412, 774, 785, 790, 791
 mercury vapor quartz lamp for, 159
 prescription for, 413
 solution for painting painful parts in, 413
 Neurotics, 82
 Neutral bath, 142
 for insomnia, 143
 for mauia, 143
 for St. Vitus's dance, 417
 New York Postgraduate Hospital, 789
 Night sweats of tuberculosis, 511
 Nissl's bodies, 403

- Nitric acid, antidote for, 217
 Nitroglycerin for bulging of artery, 371
 for hardening of arteries, 370
 for heart trouble, 366
 Noma, *see* Gangrenous sore mouth.
 Nose, care of, in baby, 667
 diseases of, 579
 guard over the mouth, 52
 obstruction of, 584
 secretions of, 52
 simple chronic catarrh of, 582
 ulceration in, 584
 Nosebleed, 196, 584
 Nostrum venders, 97
 Numbness, massage for, 154
 Nursery, 658
 Nutrition, value of massage in improving, 153
 Nutritional diseases, 266
 diet in, 266
 Nux vomica, antidote for poisoning from, 220
- O**BESITY, 773, 776
 thyroid treatment in, 394
 Obsessions, morbid, 416
 Occupation spasm, *see* Writer's cramp.
 Edema, 373
 Oil glands, 580
 heaters, 110
 of cade for psoriasis, 550
 of cloves for toothache, 166
 of eucalyptus, 134
 for laryngitis, 484
 of wintergreen, 134
 Onion poultice, 134
 Opium, antidote for, 218, 221
 Opsonins, 57
 Oriental sore, 766
 Osler, Dr. William, 48, 251, 500, 712
 Osteomyelitis, 786
 acute, 523
 Ovarian cyst, 615
 disorders, 399
 neuralgia, 412
 Ovaries, 399
 infections of, 616
 tumors of, 615
 Overeating, cause of fermentation, 310
 of heart trouble, 362
 of high blood pressure, 367
 of sour stomach, 310
 Oxalic acid, antidote for, 218
 Oxygen, 247
- P**ACK, cooling wet sheet, 151
 dry chest, 132
 for asthma, 132
 for colds, 132
 for croup, 132
 for influenza, 132
 for pleurisy, 132
 for pneumonia, 132
 for whooping cough, 132
 heating, for phlebitis, 373
 trunk, 152
 trunk, for digestive disturbances, 152
 trunk, for gas formation, 152
 trunk, for vomiting, 152
 hot blanket, 146
 for Bright's disease, 150
 for convulsions of pregnancy, 150
 for uræmic poisoning, 150
 hot leg, 150
 for congestion, 150
 for inflammation of pelvic organs, 150
 hot trunk, 150
 moist chest, 131
 neutral, 151
 protected chest, 132
 square chest, 131
 wet sheet, 150
 for insomnia, 151
 for mania, 151
 for transient fevers of infants, 152
- Pail, 120
 Pain, 193
 cause of insomnia, 424
 destroyers, 163
 effect of, on adrenal glands, 395
 electrotherapy for relief from, 158
 in bladder, hot sitz baths for, 141
 of piles, hot sitz baths for, 141
 seat of sensations of, in brain, 407
 Painful menstruation, hot sitz baths for, 141
 urination, hot sitz baths for, 141
 Palate, 479
 Palpitation of heart, 362
 Palsy, shaking, 435
 Pancreas, 297, 586
 cancer of, 351
 diseases of, 343
 Pancreatic stones, cause of chronic pancreatitis, 350
 Pancreatitis, 350, 785
 Papilloma, 602

- Paralysis, 785
 agitans, *see* Shaking palsy.
 general, of the insane, 433
 infantile, 431
 massage for, 156
 of throat muscles, 486
 parathyroid glands, 390
 Paregoric, antidote for, 218, 221
 Paresis, cause of incontinence of
 urine, 604
 Paris green, antidote for, 220
 Paronychia, *see* Nail inflammation.
 Parotid glands, 710
 Passing on, 120
 Pasteur, Louis, 48
 Pasteurization of milk, 498
 Patella, *see* Kneecap.
 Patent medicines, 85
 dangerous, 85
 harmless, 85
 Patient, administration of medicine
 to, 186
 attendant on, 174
 bedfast, bathing of, 184
 care of bowels of, 182
 care of hair of, 182
 care of mouth of, 181
 care of teeth of, 181
 feeding of, 187
 preparation for night's rest of,
 186
 record of, 174
 removal of gown of, 185
 taking temperature of, 180
 unconscious, caution in feeding of,
 190
 Pediculosis, *see* Lousiness.
 capitis, *see* Lousiness of head.
 corporis, *see* Lousiness of body.
 pubis, *see* Lousiness of pubic re-
 gion.
 Pellagra, 273
 Pelvic bones, 597
 inflammation, revulsive sitz bath
 for, 142
 loop, 317
 organs, disturbances of, cause of
 heart trouble, 362
 Pelvis, infection in, cause of hyper-
 thyroidism, 393
 Pemphigus, 550
 Pepper, as food, 255
 cause of fermentation, 310
 Pepsin, 296
 Pericarditis, 359, 785
 Perineum, lacerations of, 619
 Peristalsis, 236
 Peristaltic gradient, 299
 waves, 296, 297
 Peritoneum, 597
 tuberculosis of, 501
 Peritonitis, 785
 necessity of surgery in, 171
 Pernicious anæmia, 379
 result of absence of hydrochloric
 acid, 312
 Peroxide of hydrogen for quinsy, 481
 Pertussis, *see* Whooping cough.
 Pest, *see* Plague.
 Petrolatum, liquid, 162
 Peyer's patches, 53, 383
 Phagocytes, 57
 rapid increase of, 57
 Pharyngitis, *see* Sore throat.
 Pharynx, 579
 Phenol for gathering in ear, 576
 for infection of external auditory
 canal, 574
 Phlebitis, 373, 785
 Phobias, 416
 Phosphorus, antidote for, 218, 220
 cause of neuritis, 412
 Photophore, 159
 Phototherapy, 159
 effect of, on skin, 159
 for colds, 159
 for ulcer from varicose veins, 375
 Physician, calling of, 97
 charges of, 100
 choosing a, 97
 diagnosis by, 97
 educational work of, 99
 relation of tuberculosis patient to,
 504
 Physicians' fees, division of, 101
 Physiology of circulation, 352
 of digestion, 292
 of nervous system, 402
 of respiration, 456
 of urinary organs, 586
 Picric acid for burns, 198
 Pigeon breast, 482
 Piles, 328
 cause of itching, 559
 of rectal abscesses, 329
 Pillows, for bedfast patient, 179
 Pimples, 90, 534
 prescription for, 535
 Pineal gland, 390
 Pink eye, 566
 Pinworms, 335
 cause of itching, 559
 treatment for, 341

- Pipe smoking, cause of cancer, 794
 Pituitary gland, 390, 397
 influence of, on ovaries, 399
 on sex glands, 399
 Pityriasis versicolor, *see* Tinea versicolor.
 Plague, 688, 760.
 cause of swollen lymph nodes, 385
 geographical distribution of, 760
 Pleura, diseases of, 461
 Pleurisy, 468, 785
 dry chest pack for, 132
 fomentations for, 129
 Pneumonia, 461, 703, 719, 785
 care of bowels in, 465
 cause of inflammation of gall bladder, 347
 dry chest pack for, 132
 hydrotherapy for, 463
 influenzal, 474
 of baby, 675
 patients, garments for, 464
 prevention of, 462
 respiration in, 181
 toll of, 461
 Poison ivy, 558
 prescription for, 558
 oak, 558
 prescription for, 558
 Poisoning, 217
 unconsciousness from, 216
 Poisons, corrosive, 217
 irritant, 218
 nerve, 218
 Pollantin, 483
 Pollen, 482
 Pons Varolii, 404
 Popliteal artery, bulging of, 370
 Pork, "measly," 332
 tapeworm, 332
 treatment for, 339
 Portal vein, 298
 Potassium chlorate, cause of Bright's disease, 593
 permanganate crystals for snake bites, 227
 Pott's disease, *see* Tuberculosis of vertebræ.
 Pouches in esophagus, 307
 Poultices, 134
 charcoal, 134
 flaxseed, 134
 for sick baby, 669
 onion, 134
 white clay and glycerin, 134
 Power of choice, 59
 of will, 59
 Pox, *see* Syphilis.
 Prayer, value of, 73
 Pregnancy, 634
 bathing in, 643
 blood in, 635
 bowels in, 642
 breasts in, 634, 643
 breathing in, 635
 care of genitals in, 643
 cause of Bright's disease, 593
 of sciatica, 411
 of varicose veins, 373
 chest in, 635
 constipation in, 636
 diagnosis of, 636
 diet in, 640
 dress in, 638
 engagement of nurse in, 643
 exercise in, 641
 extra-uterine, 645
 heart in, 635
 hygiene in, 638
 kidneys in, 642
 kleptomania in, 636
 lungs in, 635
 menstruation in, 627
 mental hygiene in, 641
 nervous system in, 636
 perversion of taste in, 636
 preservation of figure in, 639
 pyromania in, 636
 skin in, 635
 spleen in, 635
 stomach in, 636
 table for calculating duration of, 637
 teeth in, 636
 thyroid gland in, 635
 toxæmia in, 643
 urine in, 635
 uterus in, 634
 vulva in, 634
 Prescription for baldness, 562
 for blackheads, 534
 for bruises, 165
 for catarrh of nose, 165
 for catarrh of throat, 165
 for chafing, 561
 for chapped face, 165
 hands, 165
 lips, 165
 for chilblains, 229
 for chronic bronchitis, 165
 inflammation of eyelids, 563

Prescriptions — *continued*.

- for constipation, 321
 - for corns, 557
 - for earache, 166
 - for eczema, 553
 - for hives, 548
 - for itching, 559
 - of jaundice, 345
 - for lupus erythematosus, 555
 - for lupus vulgaris, 554
 - for neuritis, 413
 - for non-healing sores, 164
 - ulcers, 164
 - for pimples, 535
 - for poison ivy, 558
 - for poison oak, 558
 - for prickly heat, 560
 - for psoriasis, 550
 - for ringworm of body, 765
 - of scalp, 545
 - for scabies, 541
 - for skin abrasion, 165
 - for sore throat, 479
 - for sunburn, 560
 - for tinea versicolor, 546
 - for tonsillitis, 480
 - for ulcer from varicose veins, 375
- Preservation of food, 277
- Preservatives, use of, 280
- Pressure, seat of sensations of, in brain, 407
- Prickly heat, 559
 - prescription for, 560
- Privates, care of, in baby, 667
- Professional spasm, 422
- Prostate gland, enlargement of, 606
- Protargol ointment for tropical ulcer, 766
- Protein, 241
 - action of erepsin on, 297
 - of trypsin on, 297
 - amount of, needed daily, 241
 - digestion of, 242
 - high, a cause of degenerative diseases, 289
 - standards, 285
 - table of foods rich in, 242
- Pruritus, *see* Itching.
- ani, *see* Itching anus.
- Prussian blue, for coloring food, 283
- Prussic acid, antidote for, 218
- Psoas muscle, 317
- Psoriasis, 548
 - cause of baldness, 562
 - prescriptions for, 550
- Psychasthenia, 416

- Psychasthenics, 449
- Pterygium, 569
- Ptomaine poisoning from poor cooking, 253
- Ptyalin, 294
- Ptyalism, 636
- Puberty, 625
- Puerperal fever, 49
 - infection, 617
- Pulmonary artery, 353
 - circulation, 354
 - veins, 354
- Pulmonic plague, *see* Plague.
- Pulse, 181, 358
- Purification of water, 113
- Purine bodies, 287
- Purpura, 381
- Pus in urine, 591
- Pyæmia, 719
- Pyelitis, 595, 785, 789
 - cause of stones in kidney, 598
- Pylorus, 296
- Pyorrhea, 305, 781, 784
 - cause of headache, 427
 - of iritis, 568
 - of sour stomach, 310
- Pyromania, in pregnancy, 636

- Q**UARANTINE, 694
 - for German measles, 705
 - for measles, 704
 - for mumps, 711
 - for scarlet fever, 701
- Quickening, 636
- Quinine for malaria, 685
- Quinsy, 478, 784
 - heating compress for, 133

- R**ADIAL artery, 358
- Radiotherapy, 160
- Radium for cancer, 801
 - of esophagus, 306
 - of uterus, 161, 799
- for tumor of uterus, 614
- Rage, effect of, on adrenal glands, 395
- Railway brain, 425
 - spine, 425
 - neuralgic pain in lower spine in, 412
- Rat poisons, antidote for, 220
- Rations, balanced, 248
 - chart of, 243
 - menus to illustrate, 249

- Rats, carriers of dwarf tapeworm, 334
 of plague, 688
 methods of combating, 688
- Raw meat cure fads, 333
- Rectal temperature, 181
- Rectocele, 620
- Rectum, abscess of, 329
 cancer of, 797
- Red blood cells, 55, 352, 376, 459
 corpuscles, *see* Red blood cells.
- Reed, Dr. Walter, 681, 686
- Reimer, 80
- Relapsing fever, 748
 cause of bronchitis, 749
 of pneumonia, 749
 geographical distribution of, 748
- Renal vein, 588
- Rennin, 296
- Respiration, 458
 control of, 459
 in pneumonia, 181
 massage for, 156
 normal, 181
 physiology of, 456
 rapidity of, 181
- Rest for preventing infection, 695
 for tuberculosis, 507
- Revulsive compress, 129
- Rheumatic fever, 517
 cause of neuritis, 412
 heating joint compress for, 134
 pain, massage for, 156
- Rheumatism, 786
 acute, 517
 articular, 518
 articular, 791
- Ribs, 456
- Rickets, 267, 274
- Riggs' disease, *see* Pyorrhea.
- Ringings in ear, 577
- Ringworm, 764
 cause of baldness, 562
 of beard, 545
 of body, 545, 765
 prescription for, 765
 of face, 765
 of scalp, 544, 765
 prescription for, 545
- Robinson, Victor, 35, 37
- Rockefeller Institute, 44
- Röntgen ray, 160
- Rose cold, *see* Hay fever.
- Ross, Sir Ronald, 682
- Ross, Surgeon Major-General, 46
- Round shoulders, 526
- Roundworms, 331
 common, 335
 treatment for, 341
- Roux, M., 49
- Rowley, William, 36
- Royal Academy of Medical, Physical, and Natural Sciences, 686
- Rub, alcohol, 138
 cold towel, 136
 vinegar and salt, 138
 wet hand, 136
 witch-hazel, 138
- Rubber sheet, 175
- Rubella, *see* German measles.
- Rubner, 286
- Rush, Dr. Benjamin, 780
- Russian bath, 145
 tapeworm, 334
- SACCULATION**, 307
- Sacral nerve, 412
- Saffron, for coloring food, 283
- St. Vitus's dance, 359, 785, 789
- Saline bath, 144
 sponge, 138
- Saliva, 52
- Salivary digestion, 294
 glands, 294
- Salt rheum, *see* Eczema.
- Salts in urine, 590
 inorganic, 245
 daily requirement of, 246
 importance of, 245
 table of foods rich in, 246
- Salvarsan, 41, 731
 for relapsing fever, 749
- Sarcoma, 801
- Saturday night paralysis, 412
- Scabies, 540, 693
 cause of itching, 559
 prescriptions for, 541
- Scalp, ringworm of, 544, 765
- Scarlatina, *see* Scarlet fever.
- Scarlet fever, 697
 cause of absence of menstruation, 628
 of Bright's disease, 593
 of broncho-pneumonia, 466
 of conjunctivitis, 565
 of endocarditis, 699
 of enlargement of neck glands, 699
 of gathering in ear, 575
 of hardening of arteries, 367
 of high blood pressure, 367
 of inflammation of ear, 699

- Scarlet fever — *continued*.
 cause of inflammation of kidneys, 699
 of inflammation of tonsils, 699
 of mastoiditis, 576
 of neuritis, 412
 of pleurisy, 699
 of pneumonia, 699
 of rheumatism, 699
 of St. Vitus's dance, 699
 of swollen lymph nodes, 385
 inflammation of mouth in, 302
 quarantine for, 701
 spasm of esophagus in, 306
- Schaefer, Sir Edward, 398
- Schick test, 485
- School seats, correct height of, 524
- Sciatic nerve, 411
- Sciatica, 411, 785, 790
 mercury vapor quartz lamp for, 159
- Screens, 104
- Scrofula, cause of iritis, 568
- Scurvy, 272
 infantile, 273
- Sea air, 68
- Season, influence of, on food intake, 264
- Seat worms, 335
- Sebaceous cysts, *see* Wens.
 glands, 536
- Seborrhea, 536
 cause of baldness, 562
 dry, *see* Dandruff.
 oily, 536
- Sebum, 90
- Secretin, 391
- Secretions of nose, 52
- Sella turcica, 397
- Septic intoxication, 719
 tank, 120
- Septicæmia, *see* Blood poisoning.
- Septum, 579
- Serum, Dunbar's 483
 for diphtheria, 484
- Serums for pneumonia, 467
- "Setting up" exercises, 526
- Seven-year itch, *see* Scabies.
- Sewage, composition of, 117
 disposal of, 116
 surface disposal of, 119
 three classes of, 116
 types of bacteria in, 118
- Sex, determination of, 643
 glands, 390, 399
- Sexual apathy, 400
- Shakespeare, 70
- Shaking palsy, 435
- Shingles, 414, 786
- Shock, common, cold mitten friction for, 212
 unconsciousness from, 212
 electric, unconsciousness from, 212
- Shoe for flat foot, 530
- Shoulder, bleeding in, 195
 braces, 526
 dislocation of, 205
- Shoulders of newborn baby, 651
 round, 526
- Sick, care of, 173
 headache, 349
 room, 173
 cleanliness of, 173
 location of, 173
 ventilation of, 173
- Sickness, diet in, 265
- Silver nitrate, antidote for, 218
- Sinuses, infection in, cause of hyperthyroidism, 393
- Sinusoidal electricity, 157
- Sippy, Dr. B. M., 314
 treatment, 315
- Sirup of ipecac, 164
- Sitz bath, 140
 cold rubbing, 141
 for constipation, 141
 for excessive menstruation, 141
 hot, 141
 for pain of piles, 141
 for painful urination, 141
- revulsive, 142
 for pelvic inflammation, 142
- Skin, 52, 89
 abrasion of, prescription for, 165
 abscess of, 537
 bacterial diseases of, 533
 barrier against disease, 52
 cancer of, 800
 care of facial, 92
 constitutional diseases of, 547
 effect of bathing on, 90
 of diet on, 89
 of exercise on, 90
 of massage on, 92
 of melancholia on, 90
 of phototherapy on, 159
 of sleep on, 90
 of worry on, 90
- external, 52
 hemorrhages into, 381
 important organ, 89
 in pregnancy, 635
 index of good health, 89

- Skin — *continued*.
 internal, 52
 parasitic diseases of, 540
 scaling of, in scarlet fever, 701
 various disorders of, 556
- Sleep, 70, 71, 90
 loss of, cause of fermentation, 310
 cause of sour stomach, 310
 need of, by all classes, 71
 producers, 163
 time needed for, 72
 value of massage for inducing, 154
- Sleeping in tropical countries, 771
 porch, 71
 sickness, 431, 692
- Sleeplessness, electrotherapy for, 158
- Sloughing phagedena, *see* Tropical ulcer.
- Slow fever, *see* Malta fever.
- Sluggish liver, 349
- Smallpox, 705
 cause of blindness, 35
 of Bright's disease, 593
 of bronchial pneumonia, 707
 of conjunctivitis, 565
 of gangrene of skin, 707
 of laryngitis, 707
 of neuritis, 412
 of swollen lymph nodes, 385
 confluent, 707
 difference of, from chicken pox, 708
 hemorrhagic type of, 707
 pitting of, 709
 toll of, 33
- Smell, development of sense of, in baby, 654
 sense of, 580
- Smoke, cause of chronic catarrh of nose, 583
- Snake bites, antidotes for, 227
- Sneezing, 460
- Soda for sour stomach, 311
- Sodium veronal, 163
- Soft drinks, cause of sour stomach, 310
- Solitary glands, 53
- Soothing sirups, antidote for poisoning from, 218, 221
- Sore throat, 477, 698, 784
 fomentations for, 129
 heating compress for, 133
 prescription for, 479
- Sores, antiseptic for, 164
 non-healing, prescriptions for, 164
- Sour stomach, 310
- Sources of water, 112
- Spanish-American War, 696, 716
- Spanish influenza, *see* Influenza.
- Spasm from gastralgia, 312
 of esophagus, 306
- Spasmodic tic, *see* Habit spasm.
- Specialist, 101
- Spermatozoön, 615
- Sphenoid sinus, 579
- Spices, as food, 255
- Spider bites, antidote for, 227
- Spinal cord, inflammation of, 785
 tumors of, 435
 curvature, 524
- Spleen, 383, 386, 390, 586
 enlargement of, 748
 in pregnancy, 635
 overgrowth of, 380
- Sponge, alkaline, 138
 saline, 138
- Sponging, 137
- Sprains, 515
 massage for, 156
- Sprays, 152
- Sprue, 757
- Starch, action of amylopsin on, 297
- Static electricity, 157
- Statistics concerning Bright's disease, 79
 feeble-minded, 77
 imbeciles, 77
- Status lymphaticus, 388
- Steam radiators, 111
- Steapsin, 297
- Stearate of zinc powder for shingles, 414
- Stenosis, 360
- Sterility, 399, 400, 608
- Still, Dr., 80
- Stimulants, 163
- Stimulating beverages, 254
- Stomach, 295, 586
 cancer of, 796
 disease of, 309
 fermentation in, 309
 hemorrhage from, 196, 313
 in pregnancy, 636
 juice, 296
 perforation of wall of, 313
 sour, 310
 ulcer of, 312
- Stomatitis, *see* Mouth, inflammation of.
- Stones in bladder, 603
 in kidney, 598
 in urine, 591

- Stools, disinfection of, 190
 straining at, cause of piles, 328
 Strains, 532
 Strangulated hernia, necessity of surgery in, 171
 Structural scoliosis, 525
 Strychnine, antidote for, 218, 220
 for heart trouble, 366
 for influenzal pneumonia, 476
 for pneumonia, 468
 Stupe, 129
 Sty, 564
 Sublingual glands, 710
 Submaxillary glands, 710
 Sugar, excessive amounts of, cause of
 sour stomach, 310
 in urine, 591
 urinary, test for, 775
 Sulphur for scabies, 541
 fumes for fumigation, 191
 ointment for ringworm of beard, 546
 Sulphuric acid, antidote for, 217
 Sun bath, 159
 for tuberculosis of bones, 159
 for tuberculosis of glands, 159
 for tuberculosis of joints, 159
 helmet, 770
 Sunburn, 560
 prescription for, 560
 Sunshine, artificial, 159
 Sunstroke, unconsciousness from, 210
 Suprarenal glands, 586
 Surgeon, feelings of, 171
 necessary qualifications of, 169
 Surgery, conservatism in, 170
 in the cure of disease, 167
 necessity of, in acute appendicitis, 171
 in acute intestinal obstruction, 171
 in acute mastoid infection, 171
 in acute perforating ulcer of intestines, 171
 in acute perforating ulcer of stomach, 171
 in peritonitis, 171
 in strangulated hernia, 171
 new, 37
 successes of, 39
 old, 37
 fatalities from, 38
 Swallowing foreign bodies, 308
 Sweat, 52
 duct, 537
 glands, 580
 Sweet oil for burns, 199
 Sweets, effect of excessive use of, on appetite, 238
 Swelling of glands, 54
 Swellings, massage for, 154
 Synovial fluid, 513
 membrane, 513
 Synovitis, 513
 Syphilis, 727, 786
 cause of abortion, 645
 of apoplexy, 729
 of baldness, 562
 of bulging of artery, 370
 of chronic pancreatitis, 350
 of enlargement of spleen, 387
 of epilepsy, 729
 of hardening of arteries, 368
 of hardening of liver, 343
 of heart diseases, 361
 of insanity, 729
 of iritis, 568
 of laryngitis, 483
 of locomotor ataxia, 729
 of neuritis, 412
 of paralysis, 729
 of senile dementia, 729
 of shingles, 414
 congenital, 80
 effect of, on lymph glands, 385
 gumma stage of, 728
 hereditary, 80
 history of treatment of, 41
 in newborn baby, 382
 interstitial, 432
 of nervous system, 432
 predisposing cause of neuralgia, 409
 ravages of, 41
 Wassermann test for, 730
- T**ABES dorsalis, *see* Locomotor ataxia.
 Table for calculating duration of pregnancy, 637
 of food adulterations, 282
 of foods rich in carbohydrates, 245
 in fats, 244
 in organic salts, 246
 in protein, 242
 showing amount of food needed
 daily by average child, 260
 average weight of aged, 263
 calories needed for different kinds of labor, 261
 comparative food values from economic standpoint, 288
 composition of human body, 257

Table — *continued.*

- showing composition of milk, 248
- deaths from cancer, 796
- distribution of vitamins, 268
- maintenance allowance according to climate, 264
- national dietaries, 259
- relative endurance of vegetarians, 286
- Tachycardia, 362
- Talcum powder, 153
- Tapeworms, 331
 - anatomy of, 332
 - beef, 333
 - dwarf, 334
 - fish, 334
 - pork, 332
 - Russian, 334
- Tartar emetic for bilharziosis, 766
- for kala azar, 760
- Taste buds, 52
 - perversion of, in pregnancy, 636
- Tea, cause of fermentation, 310
 - of headache, 428
 - of heart trouble, 362
 - of insomnia, 424
 - of neuritis, 412
- consumption of, 86
- drug in, 255
- Teeth, abscessed, cause of headache, 427
 - cause of shingles, 414
- care of, 782
 - of bedfast patient's, 181
- decayed, 304
 - cause of facial neuralgia, 410
 - cause of migraine, 428
 - cause of sour stomach, 310
- devitalized, 305
- early decay of, 81
- exposure of, to extremes of temperature, 301
- focal infection from, cause of high blood pressure, 368
- impacted, 304
- improper closure of, 304
- in pregnancy, 636
- infected, 780
 - cause of hyperthyroidism, 393
 - cause of pyelitis, 595
- of baby, 656
- unerupted molar, cause of headache, 427
- Teething, 671
 - chart, 655
- Telodendria, 403
- Temperature by axilla, 181
 - by rectum, 181
 - common names of, 124
 - normal, 53
 - regulation of body, 53
 - seat of sensations of, in brain, 407
- Tendons, affections of, 523
- Teschner, 525
- Testicles, 605
 - gonorrheal infection of, 608
- Tests, endurance, 286
 - intelligence, 441
- Tetanus, 719
- Tethelin, 398
- Tetter, *see* Eczema.
- Texas fever of cattle, 693
- Thigh, bleeding from, 195
- Thorax, 456
- Threadworms, 335
- Throat diseases, 477
 - tuberculosis of, 501
- Thrombophlebitis, 373
- Thrush, 302
- Thymus gland, 383, 387, 390
- Thyroid gland, 390
 - disorders of, 391
 - for cretinism, 443
 - in pregnancy, 635
- Thyroiditis, 786
- Tic douloureux, *see* Neuralgia, facial.
- Ticks, 693
- Tincture of benzoin, 484
 - of iodine for cellulitis, 723
 - for erysipelas, 718
 - for wens, 561
- Tinea tonsurans, *see* Ringworm of scalp.
 - versicolor, 546
 - prescriptions for, 546
- Tinglings, massage for, 154
- Tinnitus, *see* Ringing in ear.
- Tobacco, cause of bulging of artery, 370
 - of chronic catarrh of nose, 583
 - of heart trouble, 362
 - of high blood pressure, 367
 - of sour stomach, 310
- effects of, 83
- habit among women, 83
- Tobacco-smoking, cause of laryngitis, 483
- Toe itch, 338
- Toenail, ingrowing, 228
- Tongue, acute inflammation of, 303
 - cancer of, 800
 - of newborn baby, 651

- Tonic effect of massage, 156
friction, 135
- Tonsillitis, 477, 784
cause of Bright's disease, 477
of hardening of arteries, 367
of high blood pressure, 367
of red, boggy swellings under skin, 477
of rheumatic fever, 477
of rheumatic infection of the heart valves, 477
of St. Vitus's dance, 477
fomentations for, 129
heating compress for, 133
prescription for, 480
- Tonsils, 54, 383
diseased, 780
cause of acute osteomyelitis, 523
cause of chronic catarrh of nose, 583
cause of headache, 427
cause of high blood pressure, 368
cause of hyperthyroidism, 393
cause of iritis, 568
cause of pyelitis, 595
cause of shingles, 414
large, 481
cause of chest deformities, 482
cause of glandular fever, 482
cause of migraine, 428
structure of, 55
- Toothache drops, 166
- Toothbrush, 301
- Touch, seat of sensations of, in brain, 407
- Tourniquet, 194
- Toxæmia in pregnancy, 643
- Trachea, or windpipe, 53
- Trachoma, *see* Granulation of the eyelids.
- Traube, 56
- Traumatic neurosis, *see* Railway spine.
- Trichina, treatment for, 342
- Tropical abscess of liver, 349
countries, clothing in, 770
food in, 768
house in, 767
kitchen in, 769
personal hygiene in, 767
sleeping in, 771
vaccination in, 772
water in, 768
diarrhea, *see* Sprue.
diseases, 739, 753
ulcer, 766
- Trudeau Sanatorium, 506
- Truss for hernia, 232
- Trypsin, 297
- Tsetse fly, 692
- Tsutsugamushi, 693
- Tub baths, full, 142
- Tubercular meningitis, 501
peritonitis, *see* Tuberculosis of peritoneum.
- Tuberculin, 501
- Tuberculosis, 45, 493, 786, 792
carried by flies, 691
cause of absence of menstruation, 628
of baldness, 562
of chronic discharge of middle ear, 577
of displacement of uterus, 610
of headache, 427
of laryngitis, 483
of neuritis, 412
of secondary anæmia, 378
of shingles, 414
climate for, 504
coughing of, 511
germ of, 45
immunity from, 495
in children, 496
mortality from, 79, 500
night sweats of, 511
of adrenal gland, 397
of ankle, 515
of bones, 501
sun bath for, 159
of elbow, 515
of glands, 385
sun bath for, 159
of hip joint, 515
of joints, 501
sun bath for, 159
of kidneys, 501
of knee, 515
of lungs, 502
of lymph glands, 500
of peritoneum, 501
of spine, cause of incontinence of urine, 604
of throat, 501
of vertebrae, 516
of wrist, 515
precautions against contracting, 497, 512
rules for cure of, 512
to prevent spread of, 512
sanatoriums, 506
vomiting of 511

- Tuberculous arthritis, 515
 milk, 496
 Tumors, brain, 434
 cause of displacement of uterus, 611
 of secondary anæmia, 378
 of bile duct, cause of jaundice, 345
 of bladder, 602
 of breast, 623
 of kidney, 598
 of liver, cause of jaundice, 345
 of ovary, 615
 of spinal cord, 435
 of uterus, 612
 pelvic, cause of varicose veins, 373
 pituitary, 398
 secondary, cause of enlargement of lymph glands, 386
 Tunica vaginalis, 605
 Turbinate bones, 579
 Turkish bath, 145
 Turmeric, for coloring food, 283
 Turpentine, 134
 cause of Bright's disease, 593
 Typhoid fever, 712
 carried by flies, 691
 cause of absence of menstruation, 628
 of baldness, 562
 of Bright's disease, 593
 of enlargement of spleen, 387
 of hardening of arteries, 367
 of high blood pressure, 367
 of inflammation of gall bladder, 347
 of neuritis, 412
 of secondary anæmia, 378
 of swollen lymph nodes, 385
 of weakening of heart muscles, 365
 cold bath for, 143
 inflammation of mouth in, 302
 origin of, 49
 predisposing cause of neuralgia, 409
 prevention of, 715
 vaccination for, 716
 Typhoid, walking, 713
 of duodenum, cause of chronic pancreatitis, 350
 of esophagus, 308
 of intestines, acute perforating, necessity of surgery in, 171
 of leg, from varicose veins, 374
 of stomach, 312, 785
 acute perforating, necessity of surgery in, 171
 cause of chronic pancreatitis, 350
 syphilitic, 375
 tropical, 766
 Ulceration in nose, 584
 Ultra-violet rays, 210
 Unconsciousness after a fracture, 212
 from alcoholism, 208
 from apoplexy, 208
 from brain injury, 208
 from drowning, 214
 from electric shock, 212
 from epilepsy, 208
 from fainting, 207
 from freezing, 211
 from heart disease, 207
 from heat exhaustion, 209
 from hysteria, 216
 from poisoning, 216
 from shock, 212
 from sunstroke, 210
 from uræmic poisoning, 216
 list of principal causes of, 207
 Underhill, 274
 Undulating fever, *see* Malta fever.
 United States Public Health Service, 686
 Uræmia, 595
 Uræmic coma, cathartics for, 163
 poisoning, 216
 Urea, 590
 Ureters, 591
 Urethra, 592
 Uric acid, 518, 590
 Urinary organs, physiology of, 586
 Urine, 588
 albumin in, 590
 bacteria in, 588
 blood in, 591
 casts in, 591
 color of, 588
 composition of, 590
 disinfection of, 190
 in pregnancy, 635
 incontinence of, 603
 in baby, 676

ULCER, 774

- antiseptic for, 164
 from varicose veins, phototherapy for, 375
 prescription for, 375
 non-healing, prescription for, 164
 of cornea, 567

- Urine — *continued*.
 indican in, 591
 odor of, 588
 of newborn baby, 652
 phosphates in, 588
 pus in, 588, 591
 quantity of, 589
 salts in, 590
 specific gravity of, 589
 stones in, 591
 sugar in, 591
 urates in, 588
- Urticaria, *see* Hives.
- Uterine polypi, 615
- Uterus, 609
 cancer of, 797
 displacements of, 610
 hemorrhage from, 617
 in pregnancy, 634
 in virgin state, 634
 infections of, 616
 prolapse of, 611
 radium for cancer of, 161
 tumors of, 612
 cause of sciatica, 411
 X ray for cancer of, 161
- Uvula, 479
- V**ACATION, 65
 Vaccination, 35, 696
 for cholera, 764
 for typhoid fever, 716
 in tropical countries, 772
- Vaccine for anthrax, 50
 for boils, 538
 for pimples, 536
 for whooping cough, 488
- Vagina, 610
 in pregnancy, 634
- Vaginitis, 619
- Varicella, *see* Chicken pox.
- Varicocele, 374, 605
- Varicose veins, 328, 373
 alternate hot and cold leg bath
 for, 139
 eczema of skin of leg from, 374
 of spermatic cord, 374
 ulcer from, 374
 ulcers, alternate hot and cold leg
 bath for, 139
- Variola, *see* Smallpox.
- Varioloid, 707
- Vaulted privy, 120
- Vegetarian dietary, economy of, 288
- Vegetarianism, 285
 Bible on, 285
 in relation to cancer, 290
- Vegetarians, table showing relative
 endurance of, 286
- Veins, diseases of, 367
 pulmonary, 354
 renal, 588
 varicose, 328, 373
- Vena cava, 353, 605
- Venereal disease, 80
 infections, 726
 alarming prevalence of, 726
- Vermijelli for lousiness, 543
- Veronal, 163
- Vertebrae, tuberculosis of, 516, 517
- Vertigo, *see* Dizziness.
- Vinegar and salt rub, 138
- Vision, centers for, in brain, 407
- Vitamines, 243, 246, 266
 table showing distribution of, 268
- Voit, 286
- Volvulus, 328
- Vomiting, bismuth for, 164
 heating trunk pack for, 152
 of tuberculosis, 511
- Von Behring, 42
- Vulva in pregnancy, 634
- Vulvitis, 618
- W**ALKING for stimulating bowels,
 317
 of baby, 653
- Warts, 556
 common, 556
 flat, 556
 thread, 556
- Wassermann test, 730, 746
- Water, advantage of, in treatment of
 disease, 121
 as agent in digestion, 246
 as carrier of disease, 678, 715
 boiling of, 113
 chemical purification of, 115
 dangerous bacteria in, 115
 distillation of, 114
 drinking, disinfection of, 191
 filtration of, 114
 hot and cold, effects of, 121
 effects of, upon blood, 123
 effects of, upon glands, 123
 effects of, upon internal organs,
 123
 for congestion, 122
 reaction from, 121
 in tropical countries, 768
 itch, 338
 pure, for preventing infection, 695

- Water — *continued*.
 purification of, 113
 soluble B, 266
 C, 266
 sources of, 112
 supply, rules for regulation of, 116
 use of, at meals, 256
- Water-drinking for sick baby, 668
- Watery eye, 565
- Weaning of baby, 662
- Weather, effect of, on circulation of
 blood, 358
- Weichardt, 71
- Wells, Sir Spencer, 39
- Wens, 561
- Wet hand rub, 136
- Whipworms, 335
 treatment for, 341
- White corpuscles, 55, 352, 376
 diarrhea, *see* Sprue.
 swelling, 515
- Whitley exercisers, 526
- Whitlow, *see* Felon.
- Whooping cough, 486
 cause of broncho-pneumonia, 466
 dry chest pack for, 132
 spasm of esophagus in, 306
 vaccine for, 488
- Will, power of, 59
 surrender of, to appetite, 60
- Window tent, 510
- Windpipe, 53, 457, 460
- Winslow, Dr. Forbes, 77
- Witch-hazel rub, 138
- Womb, *see* Uterus.
- Wood alcohol, antidote for, 218, 222
- Worms, eradication of, 337
 intestinal, 331
 treatment for, 339
- Worry, 90
 cause of gray hair, 562
 of heart trouble, 362
 of insomnia, 72
 of sour stomach, 310
 enemy of health, 62
- Wound infection, 717
- Wounds, fomentations for, 129
 gunshot, 197
 prevention of infection in, 200
 puncture, disinfection of, 200
 value of massage for, 153
- Wrist, tuberculosis of, 515
- Writer's cramp, 422
- Wryneck, 526
- X** ray, 160
 for cancer, 801
 of esophagus, 306
 of skin, 161
 of uterus, 161
 for diagnosis, 161
 for lupus erythematosus, 555
 for lupus vulgaris, 555
 for malignant growths, 161
 for pimples, 536
 for psoriasis, 550
 for ringworm of face, 765
 of scalp, 545
 for tumors of uterus, 614
- Y**ALE UNIVERSITY, 286
 Yaws, 745
 geographical distribution of, 745
- Yellow fever, 681, 686, 739
- Z**INC oxide ointment for lupus vul-
 garis, 555
 for shingles, 414
- Zinc stearate for pemphigus, 550

Index of Symptoms

- ABDOMEN, COLICKY PAINS IN.**— Mountain sickness, 235.
- ABDOMEN, DISCOMFORT IN.**— Sprue, 758.
- ABDOMEN DISTENDED AND TENDER ON PRESSURE.**— Typhoid fever, 712.
- ABDOMEN, DROPSY OF.**— Cirrhosis, 343.
- ABDOMEN, GRIPING PAINS IN.**— Mushroom poisoning, 224.
- ABDOMEN, PAINS IN.**— Caisson disease, 235.
- ABDOMEN PROMINENT.**— Rickets, 275.
- ABDOMEN RIGID.**— Inflammation of gall bladder, 348.
- ABDOMEN, RIGIDITY OF RIGHT SIDE OF.**— Appendicitis, 323.
- ABDOMEN, SUDDEN, SEVERE PAIN IN.**— Intussusception, 327.
- ABDOMEN, SWELLING OF.**— Kala azar, 759.
- ABDOMEN, TENDER SPOTS OVER.**— Hysteria, 421.
- ABDOMEN TENDER TO PRESSURE AT EDGE OF RIBS ON RIGHT SIDE.**— Inflammation of gall bladder, 348.
- ABDOMEN, TENDERNESS ON LEFT SIDE OF.**— Colitis, 324.
- ABDOMEN, UPPER, PAIN IN.**— Cancer of pancreas, 351.
- ABDOMEN, UPPER, SENSE OF DISTRESS IN.**— Sour stomach, 311.
- ABDOMEN, UPPER, SUDDEN, INTENSE PAIN IN.**— Acute pancreatitis, 350.
- ABDOMINAL CAVITY, FLUID IN.**— Hookworms, 337.
- ABDOMINAL CRAMPS, WITH VOMITING.**— Lead poisoning, 221.
- ABDOMINAL DISTENTION.**— Hernia, 232.
- ABDOMINAL DISTRESS.**— Colitis, 324.
- ABDOMINAL DISTRESS AND PAIN.**— Fermentation, 309.
- ABDOMINAL PAIN.**— Poisoning from infected foods, 225.
Pork tapeworm, 333.
Roundworms, 335.
Trichina, 339.
Wood alcohol poisoning, 222.
- ACHE, DULL.**— Myalgia, 531.
- ACHE IN CALF OF LEG.**— Flat foot, 529.
- ACHE, VAGUE, RESTLESS, IN LEGS AND HIPS.**— Heart trouble, 363.
- ACHING AND PAIN IN RECTUM.**— Piles, 328.
- ACHING AND PAIN, VIOLENT, IN BACK.**— Influenza, 472.
- ACHING AND PAIN, VIOLENT, IN HEAD.**— Influenza, 472.
- ACHING AND PAIN, VIOLENT, IN LIMBS.**— Influenza, 472.
- ACHING IN BACK.**— Chicken pox, 709.
- ACHING IN EXTREMITIES.**— Chicken pox, 709.
- ACHING PAIN IN BACK.**— Tonsillitis, 477.
- ACHING PAIN IN LIMBS.**— Tonsillitis, 477.
- ANÆMIA.**— Cancer of liver, 349.
Hookworms, 337.
Scurvy, 272.
- ANKLES, FEELING OF WEAKNESS IN.**— Flat foot, 529.
- ANKLES, SWELLING OF.**— Uræmic poisoning, 216.
- ANXIETY.**— Extra-uterine pregnancy, 646.
- APPETITE ABNORMAL.**— Diabetes, 774.
- APPETITE CAPRICIOUS.**— Nervous prostration, 415.
- APPETITE EXCESSIVE.**— Sour stomach, 310.
- APPETITE, LOSS OF.**— Achylia, 311.
Acute arthritis, 518.
Black-water fever, 753.
Cancer of pancreas, 351.
Dengue, 742.
Hysteria, 421.
Malta fever, 741.
Mountain sickness, 235.
Mumps, 711.
Scarlet fever, 697.
Smallpox, 706.
Typhoid fever, 712.
- APPETITE POOR.**— Lead poisoning, 222.
Menopause, 633.
Tuberculosis, 502.
- APPETITE RAVENOUS.**— Pork tapeworm, 333.
- APPETITE UNNATURAL.**— Greensickness, 379.
- ARM, CONTINUOUS TREMOR OF.**— Hysteria, 421.

- ARM, INVOLUNTARY, JERKY MOVEMENTS IN.—St. Vitus's dance, 417.
- ARM MUSCLES, STIFFNESS IN.—Writer's cramp, 423.
- ARM MUSCLES, WEAKNESS OF.—Writer's cramp, 423.
- ARM, NUMBNESS OF.—Writer's cramp, 423.
- ARM, PAIN IN.—Writer's cramp, 423.
- ARM, PARALYSIS OF.—Hysteria, 421.
- ARM, SORENESS OF.—Writer's cramp, 423.
- ARMS, CONVULSIVE JERKINGS OF.—Epilepsy, 418.
- ARMS, CRAMPS IN.—Cholera, 763.
- ARMS JERK IN EVERY DIRECTION.—Convulsions, 672.
- ARMS, LUMPS UNDER.—Plague, 760.
- ARMS, PARALYSIS OF.—Caisson disease, 235.
- ASTHMATIC ATTACKS.—Anaphylaxis, 231.
- B**ACK, ACHING IN.—Chicken pox, 709.
Tonsillitis, 477.
- BACK, BOWING OF.—Strychnine poisoning, 220.
- BACK, CRAMPS IN.—Cholera, 763.
- BACK, EXCRUCIATING PAINS IN.—Smallpox, 706.
- BACK MUSCLES, STIFFNESS OF.—Meningitis, 427.
- BACK, NEURALGIC PAINS IN.—Hysteria, 421.
- BACK, PAIN IN.—Black-water fever, 753.
Erysipelas, 717.
Flat foot, 529.
Mumps, 711.
Nervous prostration, 415.
Plague, 760.
Railway spine, 426.
Relapsing fever, 748.
- BACK, PAINS THROUGH.—Kidney stones, 599.
- BACK, SEVERE PAIN IN.—Dengue, 742.
- BACK, TENDER SPOTS OVER.—Hysteria, 421.
- BACK, VIOLENT ACHING AND PAIN IN.—Influenza, 472.
- BACKACHE.—Dengue, 742.
Displacement of uterus, 611.
Lacerations of perineum, 620.
Menopause, 633.
Uterine tumor, 613.
- BAD BREATH, *see* Breath bad.
- BILE IN URINE.—Malignant jaundice, 346.
- BILIOUSNESS.—Hypothyroidism, 392.
- BITING CHEEK MUSCLES.—Epilepsy, 208.
- BITING TONGUE.—Epilepsy, 208.
- BLACK AND BLUE SPOTS ON SKIN.—Yellow fever, 739.
- BLADDER, INVOLUNTARY MOVEMENT OF.—Tumor of spinal cord, 435.
- BLADDER, IRRITATION OF.—Uterine tumor, 613.
- BLADDER, PAIN IN.—Appendicitis, 323.
- BLEEDING FROM NOSE, *see* Nosebleed.
- BLINDNESS.—Brain tumor, 434.
Locomotor ataxia, 433.
Mushroom poisoning, 224.
- BLISTERS, ERUPTION OF, ON SKIN OF CHEST.—Intercostal neuralgia, 410.
- BLISTERS, FULL OF CLEAR FLUID.—Impetigo, 539.
- BLOOD, EXPECTORATION OF.—Tuberculosis, 502.
- BLOODY MUCUS, VOMITING OF.—Arsenic poisoning, 220.
- BLOODY SPUTUM.—Plague, 761.
- BLOODY STOOLS, *see* Stools bloody.
- BLOODY URINE, *see* Urine bloody.
- BODY, BRILLIANT RED RASH OVER.—Tonsillitis, 478.
- BODY, CONVULSIVE JERKINGS OF.—Epilepsy, 418.
- BODY DEVELOPMENT, RETARDATION OF.—Hookworms, 337.
- BODY, EXCRUCIATING PAINS IN.—Syphilis, 729.
- BODY FAT AND SOGGY.—Hypothyroidism, 392.
- BODY, GENERAL RASH OVER.—Leptosy, 751.
- BODY, IRREGULAR PAINS IN.—Acute arthritis, 518.
- BODY MUSCLES, GENERALIZED WASTING OF.—Beriberi, 755.
- BODY RIGID.—Hysteria, 420.
- BODY STIFFENS OUT OR ARCHES BACKWARD.—Convulsions, 672.
- BODY UNDER WEIGHT.—Hookworms, 337.
- BONES ENLARGED AT EXTREMITIES.—Rickets, 275.

- BONES OF HEAD, FAILURE OF, TO CLOSE PROPERLY.—Rickets, 275.
- BONES OF HEAD, SOFT SPOTS IN.—Rickets, 275.
- BOWEL MOVEMENT, DREAD OF.—Fissure, 330.
- BOWEL MOVEMENT, PAIN WITH.—Colitis, 324.
- BOWEL MOVEMENTS VERY FREQUENT AND MUSHY.—Colitis, 324.
- BOWELS BLOATED.—Sprue, 758.
- BOWELS DISTENDED WITH GAS.—Colic, 670.
- BOWELS, DISTENTION OF.—Fermentation, 309.
- BOWELS, INVOLUNTARY MOVEMENT OF.—Tumor of spinal cord, 435.
- BOWELS, IRREGULARITY OF.—Pellagra, 274.
- BOWELS, PASSING OF BLOODY MUCUS FROM.—Intussusception, 327.
- BRAIN, PAIN AT BASE OF.—Meningitis, 427.
- BREAST, ENLARGEMENT OF.—Pregnancy, 636.
- BREAST, GRADUAL SWELLING OF.—Elephantiasis, 745.
- BREAST, HARD LUMP IN.—Cancer, 799.
- BREAST, HYPERSENSITIVE.—Hysteria, 421.
- BREAST, PUCKERING OR DIMPLING OF SKIN OF.—Cancer, 799.
- BREAST, SORENESS OF.—Menopause, 633.
- BREAST, TENDERNES, PAIN, AND SWELLING IN.—Acute mastitis, 622.
- BREASTBONE, INCREASING SENSE OF FULLNESS UNDER.—Narrowing of esophagus, 305.
- BREATH BAD.—Achyilia, 311.
Constipation, 319.
Lead poisoning, 222.
- BREATH CATCHY WITH PECULIAR GRUNT.—Pneumonia, 676.
- BREATH, FETID ODOR TO.—Inflammation of mouth, 302.
- BREATH FOUL.—Tonsillitis, 477.
- BREATH, FRUITY ODOR TO.—Diabetes, 774.
- BREATH, ODOR OF URINE ON.—Uræmic poisoning, 216.
- BREATH SHORT, GASPING.—Mountain sickness, 234.
- BREATH, SHORTNESS OF.—Aneurysm, 370.
Bright's disease, 594.
- BREATH, SHORTNESS OF, ON SLIGHT EXERTION.—Heart trouble, 363.
- BREATHING DEEP AND RAPID.—Diabetes, 774.
- BREATHING DIFFICULT.—Beriberi, 756.
Epidemic dropsy, 757.
Hysteria, 421.
- BREATHING DIFFICULT AND RAPID.—Empyema, 471.
Pleurisy, 469.
Pneumonia, 462.
- BREATHING, DIFFICULTY IN.—Plague, 761.
- BREATHING HEAVY.—Apoplexy, 372.
- BREATHING LABORED AND RAPID.—Sunstroke, 210.
- BREATHING NOISY.—Croup, 675.
- BREATHING NOISY AND IRREGULAR.—Convulsions, 672.
- BREATHING NOISY AND VERY RAPID.—Apoplexy, 208.
- BREATHING RAPID.—Extra-uterine pregnancy, 646.
- BREATHING RAPID, JERKY.—Hysteria, 421.
- BREATHING SHALLOW.—Heat exhaustion, 209.
Poisoning from headache powder, 220.
- BREATHING SLOW.—Opium poisoning, 221.
- BREATHING STOPS FOR MOMENT.—Convulsions, 672.
- BREATHING VERY RAPID AND SHALLOW.—Pneumonia, 676.
- BREATHLESSNESS.—Greensickness, 379.
Pernicious anæmia, 379.
Secondary anæmia, 378.
- BURNING FROM MOUTH TO STOMACH.—Lead poisoning, 221.
- BURNING IN MOUTH.—Naphtha poisoning, 223.
- BURNING IN STOMACH.—Naphtha poisoning, 223.
Sour stomach, 310.
- BURNING IN THROAT.—Sour stomach, 310.
- BURNING OF SKIN OF FACE.—Facial neuralgia, 410.
- BURNING OF SKIN OF LEG.—Sciatica, 411.
- BURNING ON SOLES OF FEET.—Epidemic dropsy, 756.
- BURNING SENSATIONS IN PENIS.—Gonorrhea, 732.

BURNING SENSATIONS IN SKIN.—
Neuralgia, 409.

BUZZING IN EARS.—Mountain sickness, 234.

CCHEEK BONE, PAIN IN.—Facial neuralgia, 410.

CHEEK MUSCLES, BITING.—Epilepsy, 208.

CHEEKS, INSIDE OF, COVERED WITH WHITE PATCHES LIKE PIECES OF CURDLED MILK.—Thrush, 302.

CHEEKS PALE.—Pneumonia, 676.

CHEEKS PUFFED OUT.—Inflammation of mouth, 302.

CHEEKS, SWELLING OF.—Mumps, 711.

CHEST, BRILLIANT RED RASH ON.—Tonsillitis, 478.

CHEST, ERUPTION OF TINY BLISTERS ON SKIN OF.—Intercostal neuralgia, 410.

CHEST, FULLNESS IN.—Heart trouble, 363.

CHEST, PAIN AND SORENESS IN.—Measles, 702.

CHEST, PAIN IN.—Influenza, 472.

CHEST, TENDER SPOTS ON SKIN OF.—Intercostal neuralgia, 410.

CHEST, TENDER SPOTS OVER.—Hysteria, 421.

CHEST WALL, BULGING OF.—Aneurysm, 371.

CHEWING, DIFFICULTY IN.—Botulism, 226.

CHEWING, PAIN ON.—Facial neuralgia, 410.

CHILD CRIES PITIFULLY.—Colic, 670.

CHILD MAKES CHOKING SOUND.—Convulsions, 672.

CHILD STOPS BREATHING FOR A MOMENT.—Convulsions, 672.

CHILLINESS.—Cellulitis, 723.

Hypothyroidism, 392.

Measles, 702.

Mumps, 711.

Yellow fever, 739.

CHILLINESS, FEELING OF.—Chicken pox, 709.

CHILLS.—Acute mastitis, 622.

Acute osteomyelitis, 523.

Blood poisoning, 720.

Elephantiasis, 744.

Empyema, 471.

Erysipelas, 717.

Gallstones, 347.

Influenza, 472.

Kidney stone, 600.

Plague, 761.

Pleurisy, 469.

Pneumonia, 462.

Relapsing fever, 748.

Tonsillitis, 477.

Trichina, 339.

CHILLS FOLLOWED BY FEVER.—Appendicitis, 323.

CHILLS, HEAVY.—Pyelitis, 596.

CHILLS, SEVERE.—Pyæmia, 720.

Smallpox, 706.

CHILLY SENSATIONS.—Gathering in ear, 575.

CHOKING SOUND.—Convulsions, 672.

CLENCHED HANDS.—Epilepsy, 208.

COATED, DRY TONGUE.—Blood poisoning, 720.

COATED TONGUE, *see* Tongue coated.

COLD AND HOT, SENSE OF, DIMINISHED.—Beriberi, 755.

COLD, CLAMMY HANDS.—Nervous prostration, 415.

COLD FEET, *see* Feet cold.

COLD HANDS.—Arsenic poisoning, 220.

Hypoadrenia, 396.

COLD, MOIST SKIN.—Naphtha poisoning, 223.

COLD PERSPIRATION.—Intussusception, 327.

COLD SENSATIONS FOLLOWING HOT FLASHES.—Menopause, 633.

COLD, SENSE OF, ABOLISHED.—Tumor in spinal cord, 435.

COLD SKIN.—Cholera, 763.

COLIC.—Lead poisoning, 222.

COLICKY PAINS.—Cholera, 763.

COMPLEXION BAD.—Constipation, 319.

COMPLEXION FLORID.—High blood pressure, 368.

CONCENTRATION, LACK OF.—Nervous prostration, 415.

CONGESTION OF THROAT.—Beriberi, 756.

CONSTIPATION.—Appendicitis, 323.

Beriberi, 755.

Dengue, 742.

Diabetes, 774.

Fissure, 330.

Hypothyroidism, 392.

Influenza, 472.

Lacerations of perineum, 620.

Lead poisoning, 221.

Malta fever, 741.

CONSTIPATION — *continued*.

Menopause, 633.

Pregnancy, 636.

Relapsing fever, 748.

CONVULSIONS.—Brain syphilis, 427.

Brain tumor, 434.

Epilepsy, 418.

Erysipelas, 717.

Malignant jaundice, 346.

Meningitis, 427.

Phosphorus poisoning, 220.

Roundworm, 335.

Scarlet fever, 697.

Smallpox, 706.

Strychnine poisoning, 220.

Typhoid fever, 712.

CONVULSIONS FOLLOWED BY PARALYSIS AND COLLAPSE.—Arsenic poisoning, 220.

CONVULSIONS FOLLOWING HEADACHE.—Sunstroke, 210.

CONVULSIONS, FREQUENT OCCURRENCE OF.—Rickets, 275.

CONVULSIONS, TERRIFIC.—Mushroom poisoning, 224.

COUGH.—Dust diseases, 233.

Hay fever, 483.

Influenza, 472.

Malta fever, 741.

Tuberculosis, 502.

Typhoid fever, 713.

COUGH, DRY.—Heart trouble, 363.

COUGH, DRY AND TIGHT.—Bronchitis, 675.

COUGH, DRY, PURPOSELESS, BARKING.—Hysteria, 421.

COUGH, HOARSE, HARD.—Measles, 702.

COUGH, LOOSE AND RATTLING.—Bronchitis, 675.

COUGH, PERSISTENT.—Whooping cough, 487.

COUGH, PERSISTENT, BRASSY.—Aneurysm, 370.

COUGH, SHORT, PAINFUL.—Empyema, 471.

Pleurisy, 469.

Pneumonia, 462.

COUGHING OF GREENISH-YELLOW MATERIAL.—Dust diseases, 234.

CRAMPING OF BODY MUSCLES.—

Strychnine poisoning, 220.

CRAMPS, ABDOMINAL.—Lead poisoning, 221.

CRAMPS IN ARMS.—Cholera, 763.

CRAMPS IN BACK.—Cholera, 763.

CRAMPS IN LEGS.—Cholera, 763.

Sciatica, 411.

CRAVING FOR STARCHY AND SWEET FOODS.—Diabetes, 774.

CRY PRECEDING SPASM.—Epilepsy, 208.

CRY, SHARP, SHRILL, COMING ON IN PAROXYSMS.—Colic, 670.

DEAFNESS.—Gathering in ear, 575.

Infection of external auditory canal, 574.

DEBILITY.—Chronic pancreatitis, 350.
Lacerations of perineum, 620.

DELIRIUM.—Blood poisoning, 720.

Erysipelas, 717.

Malignant jaundice, 346.

Meningitis, 430.

Relapsing fever, 748.

Typhoid fever, 712.

DEPRESSION.—German measles, 704.

Hay fever, 483.

Menopause, 633.

Psychasthenia, 416.

Shingles, 414.

DIARRHEA.—Cholera, 763.

Dengue, 742.

Epidemic dropsy, 756.

Fermentation, 309.

Influenza, 472.

Lead poisoning, 221.

Menopause, 633.

Mercury poisoning, 219.

Mountain sickness, 235.

Mushroom poisoning, 224.

Plague, 760.

Poisoning from infected foods, 225.

Pork tapeworm, 333.

Roundworm, 335.

Scurvy, 272.

Typhoid fever, 712.

DIGESTION, CHRONIC DISTURBANCE OF.—Cirrhosis, 343.

DIGESTION, DISTURBANCES OF.—

Menopause, 633.

Nervous prostration, 415.

Yaws, 746.

DIGESTION POOR.—Tuberculosis, 502.

DISCHARGE OF LARGE AMOUNTS OF MUCUS.—Colitis, 324.

DISCHARGE OF PUS.—Gonorrhea, 732.

DISTRESS.—Hay fever, 483.

DISTRESS AFTER EATING.—Gallstones, 346.

- DIZZINESS.—Arteriosclerosis, 368.
 Botulism, 226.
 Brain tumor, 434.
 Caisson disease, 235.
 German measles, 704.
 Mountain sickness, 234.
 Mushroom poisoning, 224.
 Nervous prostration, 415.
 Pellagra, 274.
 Scurvy, 272.
 Wood alcohol poisoning, 222.
 DIZZY SPELLS PERIODICALLY.—Mountain sickness, 234.
 DOUBLE VISION.—Botulism, 226.
 Mushroom poisoning, 224.
 DROPSY.—Bright's disease, 593.
 Hookworms, 337.
 DROPSY OF ABDOMEN.—Cirrhosis, 343.
 DROWSINESS.—Brain tumor, 426.
 Migraine, 429.
 Opium poisoning, 221.
 DRY SKIN.—Cholera, 763.
 Typhoid fever, 713.
 DYSPEPSIA, CHRONIC.—Chronic pancreatitis, 350.

EAR, FEELING OF FULLNESS IN.—Gathering in ear, 575.
 EAR, PAIN IN.—Gathering in ear, 575.
 EAR, REDNESS AND SWELLING BEHIND.—Mastoiditis, 576.
 EAR, RINGING IN.—Gathering in ear, 575.
 EAR, TENDER TO TOUCH.—Infection of external auditory canal, 574.
 EAR, TENDERNESSE BEHIND.—Mastoiditis, 576.
 EARS, BUZZING IN.—Mountain sickness, 234.
 EARS, NODULES ON.—Gout, 779.
 EARS, RINGING IN.—Mumps, 711.
 Nervous prostration, 415.
 EATING CHALK.—Hookworms, 337.
 EATING DIRT.—Hookworms, 337.
 EATING, DISTRESS AFTER.—Gallstones, 346.
 EATING, DISTRESS AND FULLNESS AFTER.—Heart trouble, 363.
 EATING, HEAVINESS AND DISTRESS AFTER.—Achyilia, 311.
 EATING, SLEEPY, DROWSY CONDITION AFTER.—Achyilia, 311.
 EMACIATION.—Chronic pancreatitis, 350.
 Hysteria, 421.
 EMACIATION, RAPID.—Pyæmia, 720.
 ERUPTION, MEASLES LIKE, ON FACE OR TRUNK.—Epidemic dropsy, 757.
 ERUPTION, MEASLES LIKE, ON SKIN.—Dengue, 742.
 ERUPTION OF WATER BLISTERS.—Shingles, 414.
 ERUPTION ON ARMS.—Shingles, 414.
 ERUPTION ON FACE.—Shingles, 414.
 ERUPTION ON LOWER LIMBS.—Shingles, 414.
 ERUPTION, ROUND, RED.—Ringworm, 545.
 ERUPTION, SHINING RED, HOT, AND TENDER.—Erysipelas, 717.
 EXHAUSTION.—Shingles, 414.
 EXPECTORATION OF BLOOD.—Tuberculosis, 502.
 EXPRESSION LISTLESS AND DULL.—Typhoid fever, 713.
 EYE, CONGESTION AND INFLAMMATION OF.—Ulcer of cornea, 568.
 EYE, DISCHARGE FROM.—Conjunctivitis, 565.
 EYE, FEELING AS IF SAND IN.—Conjunctivitis, 565.
 EYE, MEMBRANE OF, RED AND SWOLLEN.—Conjunctivitis, 563.
 EYE RED.—Iritis, 568.
 EYE, SENSITIVENESS OF, TO LIGHT.—Iritis, 568.
 EYE, WHITE OF, YELLOW.—Jaundice, 344.
 EYEBALL, PAIN IN.—Facial neuralgia, 410.
 EYEBALLS, MARKED SORENESS BACK OF.—Dengue, 742.
 EYELASHES DISTORTED.—Chronic inflammation of eyelids, 563.
 EYELASHES, WHITISH SCALES AROUND BASE OF.—Chronic inflammation of eyelids, 563.
 EYELASHES, YELLOWISH CRUSTS ON.—Chronic inflammation of eyelids, 563.
 EYELID DROOPING.—Brain syphilis, 427.
 EYELID, RED SWELLING AT EDGE OF.—Sty, 564.
 EYELID, YELLOWISH POINT ON.—Sty, 564.
 EYELIDS, HOT, HEAVY FEELING IN.—Conjunctivitis, 565.
 EYELIDS, ITCHING OF.—Chronic inflammation of eyelids, 563.
 Conjunctivitis, 565.

- EYELIDS, MARGINS OF, SWOLLEN AND REDDENED.**—Chronic inflammation of eyelids, 563.
EYELIDS, PUFFING OF.—Uræmic poisoning, 216.
EYELIDS, SMARTING OF.—Conjunctivitis, 565.
EYELIDS, SORENESS OF.—Chronic inflammation of eyelids, 563.
EYES, BLURRING OF.—Ulcer of cornea, 568.
EYES BRIGHT.—Typhoid fever, 713.
EYES CLOSED IN SEMICONSCIOUS STATE.—Hysteria, 420.
EYES CONGESTED.—Yellow fever, 739.
EYES, CONVULSIVE JERKINGS OF.—Epilepsy, 418.
EYES, CROSSING OF.—Meningitis, 427.
EYES, FLASHES OF LIGHT BEFORE.—Migraine, 429.
EYES INFLAMED.—Arsenic poisoning, 220.
EYES PUFFY.—Bright's disease, 593.
EYES RED.—Alcoholism, 208.
EYES ROLL.—Convulsions, 672.
EYES, SENSITIVENESS OF, TO LIGHT.—Chronic inflammation of eyelids, 563.
 Conjunctivitis, 565.
 Iritis, 568.
 Measles, 702.
 Sunstroke, 210.
 Ulcer of cornea, 568.
EYES, SPOTS BEFORE.—Migraine, 429.
 Mountain sickness, 234.
EYES SQUINT.—Brain syphilis, 427.
EYES STARE.—Convulsions, 672.
EYES SUFFUSED, RED, AND IRRITATED.—Hay fever, 483.
EYES TIRE OF CLOSE WORK.—Chronic inflammation of eyelids, 563.
EYES TURN CROSSEYED.—Convulsions, 672.
EYES, WATERING OF.—Whooping cough, 487.
EYES WATERY AND IRRITATED.—Measles, 702.
EYES, WHITES OF, YELLOW.—Yellow fever, 739.
EYESIGHT DIM.—Encephalitis, 431.
 Locomotor ataxia, 433.
EYESIGHT FAILING.—Bright's disease, 594.
EYESIGHT, PROGRESSIVE LOSS OF.—Brain tumor, 434.
FACE, AGONIZING PAIN IN.—Facial neuralgia, 409.
FACE AND LIMBS LIVID.—Poisoning from headache powder, 220.
FACE BLANCHED.—Heat exhaustion, 209.
FACE BLUIISH.—Cholera, 763.
 Convulsions, 672.
FACE BLUIISH AND PERSPIRING.—Croup, 675.
FACE CONGESTED.—Dengue, 742.
FACE, CONVULSIVE JERKINGS OF.—Epilepsy, 418.
FACE DARK AND LIVID.—Epilepsy, 418.
FACE FLUSHED.—Alcoholism, 208.
 Empyema, 471.
 Opium poisoning, 221.
 Pleurisy, 469.
 Pneumonia, 462.
 Typhoid fever, 713.
FACE FLUSHED AND PURPLE.—Apoplexy, 208.
FACE FLUSHED AND SWOLLEN.—Yellow fever, 739.
FACE, INVOLUNTARY JERKY MOVEMENTS IN.—St. Vitus's dance, 417.
FACE LOOKS BOILED.—Measles, 702.
FACE PALLID.—Blood poisoning, 720.
FACE PUFFY.—Bright's disease, 593.
FACE PURPLE.—Opium poisoning, 221.
FACE RED-PURPLISH.—Sunstroke, 210.
FACE, RING-SHAPED LESIONS ON.—Ringworm, 545.
FACE, SPASM OF MUSCLES OF.—Facial neuralgia, 410.
FACE, SWELLING OF.—Facial neuralgia, 410.
FACE SWOLLEN.—Beriberi, 755.
 Measles, 702.
 Sunstroke, 210.
FACE, TINGLING OF.—Migraine, 429.
FACES, MAKING.—St. Vitus's dance, 417.
FAINTING.—Greensickness, 379.
 Menopause, 633.
FAINTING SPELLS, SUGGESTIONS OF.—Caisson disease, 235.
FAINTNESS.—Secondary anæmia, 378.
FAINTNESS, FEELINGS OF.—Intussusception, 327.
FALLING VIOLENTLY TO FLOOR.—Epilepsy, 418.

- FATIGUE.—Nervous prostration, 415.
Scarlet fever, 697.
Scurvy, 272.
- FATIGUE EASILY.—Interstitial syphilis, 432.
- FEAR OF BEING ALONE.—Psychasthenia, 416.
- FEAR OF BEING IN A CROWD.—Psychasthenia, 416.
- FEAR OF CLOSED ROOM.—Psychasthenia, 416.
- FEAR OF CONTAMINATION BY FILTH.—Psychasthenia, 416.
- FEAR OF MOVING VEHICLES.—Psychasthenia, 416.
- FEELING, LOSS OF.—Hysteria, 421.
- FEET, BURNING ON SOLES OF.—Epidemic dropsy, 756.
- FEET COLD.—Arsenic poisoning, 220.
Hypoadrenia, 396.
Nervous prostration, 415.
- FEET, GANGRENE OF.—Hardening of arteries, 368.
- FEET, PAIN IN.—Scurvy, 272.
- FEET, SWELLING OF.—Greensickness, 379.
Secondary anæmia, 378.
- FEVER.—Acute mastitis, 622.
Acute osteomyelitis, 523.
Anaphylaxis, 231.
Bright's disease, 593.
Cellulitis, 723.
Elephantiasis, 744.
Epidemic dropsy, 756.
Gallstones, 347.
Gonorrheal inflammation of Fallopian tubes, 617.
Inflammation of gall bladder, 348.
Leprosy, 751.
Roundworm, 335.
Trichina, 339.
Typhoid fever, 712.
- FEVER BEGINS ABRUPTLY HIGH.—Smallpox, 706.
- FEVER FLUCTUATES.—Kala azar, 759.
- FEVER FOLLOWING CHILLS.—Appendicitis, 323.
- FEVER, HIGH.—Convulsions, 672.
Dengue, 742.
Empyema, 471.
Erysipelas, 717.
Kidney stones, 600.
Plague, 760.
Pleurisy, 469.
Pneumonia, 462.
Pyæmia, 720.
Pyelitis, 596.
Quinsy, 479.
Relapsing fever, 748.
Tonsillitis, 477.
Yellow fever, 739.
- FEVER, HIGH, WITH CHILL.—Catarrhal jaundice, 346.
- FEVER, IRREGULAR.—Yaws, 746.
- FEVER, MODERATE.—Blood poisoning, 720.
- FEVER, SLIGHT.—Chicken pox, 709.
German measles, 704.
Secondary anæmia, 378.
Shingles, 414.
Tuberculosis, 502.
- FEVER SORES ON LIPS, *see* Lips, fever sores on.
- FEVER, STEELIKE RISE OF.—Malta fever, 741.
- FINGER NAILS BLUISH.—Cholera, 763.
- FINGER, SWELLING OF.—Felon, 725.
- FINGER TIPS, BLUENESS OF.—Mountain sickness, 234.
- FINGERS, EXTREME TENDERNESS OF.—Felon, 725.
- FLATULENCE.—Gallstones, 346.
- FLORID COMPLEXION.—High blood pressure, 368.
- FLUSHED FACE, *see* Face flushed.
- FLUSHED, SWOLLEN FACE.—Yellow fever, 739.
- FOOD, COARSE, DIFFICULTY IN SWALLOWING.—Spasm of esophagus, 307.
- FOOD, REGURGITATION OF.—Narrowing of esophagus, 305.
Spasm of esophagus, 306.
- FOOD RETARDED AT OPENING OF STOMACH.—Spasm of esophagus, 306.
- FOOT, DESTRUCTION OF BONES OF.—Madura foot, 747.
- FOOT, FEELING OF WEAKNESS ABOUT INNER SIDE OF.—Flat foot, 529.
- FOOT GREATLY ENLARGED.—Madura foot, 747.
- FOOT STUDDED WITH BROKEN-DOWN NODULES.—Madura foot, 747.
- FOOT, SWELLINGS ON SOLE OF.—Madura foot, 747.
- FOREARM MUSCLES PARALYZED.—Lead poisoning, 222.
- FOREARM MUSCLES, WASTING OF.—Beriberi, 755.
- FOREHEAD, PAIN OVER.—Facial neuralgia, 410.

FROTHING AT MOUTH.—Sunstroke, 210.

FROTHY VOMITING.—Epilepsy, 208.

GAGGING, INCESSANT.—Hysteria, 421.

GANGRENE OF FEET.—Hardening of arteries, 368.

GAS.—Colitis, 324.

GAS, BELCHING OF.—Fermentation, 309.

Sour stomach, 310.

GAS, BOWELS DISTENDED WITH.—Colic, 670.

GAS, STOMACH DISTENDED WITH.—Colic, 670.

GASPING BREATH.—Mountain sickness, 234.

GASTRO-INTESTINAL UPSET.—Shingles, 414.

GIDDINESS.—Heat exhaustion, 209.

GLANDS OF NECK SWOLLEN.—Quinsy, 479.

Tonsillitis, 478.

GREASY HAIR.—Oily seborrhea, 536.

GREASY SCALP.—Oily seborrhea, 536.

GRIMACING, HORRIBLE.—Epilepsy, 418.

GRINDING OF TEETH.—Epilepsy, 418.
Roundworm, 335.

GROIN GLANDS, ATTACKS OF PAIN AND SWELLING IN.—Elephantiasis, 744.

GROIN, LUMPS IN.—Plague, 760.

GUMS, BLUENESS OF.—Mountain sickness, 234.

GUMS, HEMORRHAGES FROM.—Scurvy, 272.

GUMS SWOLLEN AND BLEEDING.—Yellow fever, 739.

HAIR ABNORMALLY GREASY.—Oily seborrhea, 536.

HAIR DRY.—Hypothyroidism, 392.

HAIR DRY, LUSTERLESS, AND BRITTLE.—Ringworm, 544.

HAIR, FALLING OUT OF.—Dandruff, 537.

Hypothyroidism, 392.

Leprosy, 752.

HAND, CONTINUOUS TREMOR OF.—Hysteria, 421.

HAND GREATLY SWOLLEN.—Cellulitis, 722.

HAND, INVOLUNTARY JERKY MOVEMENTS IN.—St. Vitus's dance, 417.

HAND, LINES ON, OBLITERATED.—Cellulitis, 722.

HAND, NUMBNESS OF.—Writer's cramp, 423.

HAND, PAIN IN.—Writer's cramp, 423.

HAND, PARALYSIS OF.—Hysteria, 421.

HAND, RED LINES RUNNING UP ARM FROM.—Cellulitis, 723.

HAND, SORENESS OF.—Writer's cramp, 423.

HANDS COLD.—Arsenic poisoning, 220.

Hypoadrenia, 396.

HANDS COLD, CLAMMY.—Nervous prostration, 415.

HANDS, CONTINUOUS TREMOR OF.—Shaking palsy, 435.

HANDS, RING-SHAPED LESIONS ON BACK OF.—Ringworm, 545.

HANDS TIGHTLY CLENCHED.—Epilepsy, 208.

HAY-FEVER-LIKE ATTACKS.—Anaphylaxis, 231.

HEAD, FEELING OF FULLNESS IN.—Nervous prostration, 415.

HEAD, FEELING OF PAIN IN.—Nervous prostration, 415.

HEAD, FEELING OF PRESSURE IN.—Nervous prostration, 415.

HEAD, HEADACHE IN TOP OF.—Displacement of uterus, 611.

HEAD, HOT FLUSHES ABOUT.—Nervous prostration, 415.

HEAD, IRREGULARITY IN SHAPE OF.—Rickets, 275.

HEAD, NEURALGIC PAINS IN.—Hysteria, 421.

HEAD, RETRACTION OF.—Meningitis, 427.

HEAD, SEVERE PAINS IN.—Yellow fever, 739.

HEAD, SWEATING OF.—Rickets, 275.

HEAD, VIOLENT ACHING AND PAIN IN.—Influenza, 472.

HEADACHE.—Achyia, 311.

Acute mastitis, 622.

Arteriosclerosis, 368.

Black-water fever, 753.

Bright's disease, 593.

Caisson disease, 235.

Catarrhal jaundice, 346.

Cellulitis, 723.

Constipation, 319.

Encephalitis lethargica, 431.

Erysipelas, 717.

- HEADACHE — *continued*.
 Fermentation, 309.
 German measles, 704.
 Hay fever, 483.
 Heat exhaustion, 209.
 Leprosy, 751.
 Malignant jaundice, 346.
 Malta fever, 741.
 Menopause, 633.
 Pellagra, 274.
 Railway spine, 426.
 Scarlet fever, 697.
 Typhoid fever, 712.
 Wood alcohol poisoning, 222.
 HEADACHE, CONSTANT, SEVERE.—Sun-
 stroke, 210.
 HEADACHE, DEEP, BORING.—Brain ab-
 scess, 426.
 HEADACHE, DULL.—Beriberi, 755.
 HEADACHE FOLLOWED BY CONVUL-
 SIONS.—Sunstroke, 210.
 HEADACHE, FRONTAL.—Mountain
 sickness, 235.
 HEADACHE IN TOP OF HEAD.—Dis-
 placement of uterus, 611.
 HEADACHE, INTENSE.—Smallpox, 706.
 HEADACHE, NIGHTLY.—Yaws, 746.
 HEADACHE, SEVERAL DAYS OF.—
 Mumps, 711.
 HEADACHE, SEVERE.—Brain abscess,
 426.
 Plague, 760.
 HEADACHE, SEVERE, ABOVE EYES.—
 Relapsing fever, 748.
 HEADACHE, SEVERE, PERSISTENT.—
 Brain tumor, 434.
 HEADACHE, SEVERE, PERSISTENT, AND
 WORSE AT NIGHT.—Brain syphi-
 lis, 427.
 HEADACHE, SICK.—Biliousness, 349.
 HEARING DULL.—Hypothyroidism,
 392.
 HEART, ATTACKS OF SEVERE PAIN
 ABOUT.—Arteriosclerosis, 368.
 HEART, DISTRESS ABOUT.—Nervous
 prostration, 415.
 HEART, PAIN OVER.—Heart trouble,
 363.
 HEART, PALPITATION OF, *see* Palpita-
 tion of heart.
 HEART, RAPID.—Acute osteomyelitis,
 523.
 HEAT, SENSE OF, ABOLISHED.—Tumor
 in spinal cord, 435.
 HEMORRHAGES FROM BOWELS AND
 STOMACH.—Yellow fever, 739.
 HEMORRHAGES FROM GUMS.—Scurvy,
 272.
 HEMORRHAGES FROM INTESTINAL
 TRACT.—Scurvy, 272.
 HEMORRHAGES FROM NOSE.—Scurvy,
 272.
 HEMORRHAGES FROM SKIN.—Scurvy,
 272.
 HEMORRHAGES FROM STOMACH.—Ul-
 cer of stomach, 313.
 HEMORRHAGES UNDER SKIN.—Yellow
 fever, 739.
 HICCUGH.—Hysteria, 421.
 HIP, PAIN IN.—Flat foot, 529.
 HIPS, VAGUE, RESTLESS ACHE IN.—
 Heart trouble, 363.
 HIVES.—Anaphylaxis, 231.
 HOARSE, HARD COUGH.—Measles, 702.
 HOARSE VOICE.—Laryngitis, 483.
 HOT AND COLD, SENSE OF, DIMINISHED.
 —Beriberi, 755.
 HOT FLASHES FOLLOWED BY COLD SEN-
 SATION.—Menopause, 633.
 HOT LIQUIDS, INABILITY TO SWALLOW
 OTHER FOODS THAN.—Narrowing
 of esophagus, 305.
 HYSTERIA.—Menopause, 633.
 INDIGESTION.—Lead poisoning,
 222.
 Pellagra, 274.
 INDIGESTION WITH LOSS OF WEIGHT
 AND STRENGTH.—Cancer of liver,
 349.
 INDISPOSITION.—Malta fever, 741.
 Smallpox, 706
 INSANITY, EXPRESSED FEAR OF.—
 Nervous prostration, 415.
 INSOMNIA.—Malta fever, 741.
 Psychasthenia, 416.
 INTESTINAL TRACT, HEMORRHAGES
 FROM.—Scurvy, 272.
 IRIS, COLOR OF, CHANGED.—Iritis,
 568.
 IRIS DULL AND SWOLLEN.—Iritis,
 568.
 IRRITABILITY.—Rickets, 275.
 St. Vitus's dance, 417.
 ITCHING.—Scabies, 540.
 ITCHING ABOUT RECTUM.—Itching
 anus, 329.
 Piles, 328.
 ITCHING IN EAR.—Infection of exter-
 nal auditory canal, 574.
 ITCHING IN RECTUM.—Piles, 328.

ITCHING OF EYELIDS.—Chronic inflammation of eyelids, 563.

Conjunctivitis, 565.

ITCHING OF SKIN.—Jaundice, 345.

JAUNDICE.—Cancer of pancreas, 351.

Yellow fever, 739.

JAWS, GRINDING OF.—Epilepsy, 418.

JAWS LOCKED.—Strychnine poisoning, 220.

JAWS, PAIN ON MOVEMENT OF.—Mumps, 711.

JOINT, PAIN ON PRESSURE AND MOTION OF.—Tubercular arthritis, 516.

JOINT PAINS.—Dengue, 742.

JOINT, RIGIDITY OF MUSCLE CONTROLLING.—Tubercular arthritis, 516.

JOINT, SWELLING OF.—Tubercular arthritis, 516.

JOINTS HOT TO TOUCH.—Acute arthritis, 518.

JOINTS, IRREGULAR PAINS IN.—Acute arthritis, 518.

JOINTS, NODULES ON.—Gout, 779.

JOINTS, PAINS IN.—Yaws, 746.

JOINTS REDDISH.—Acute arthritis, 518.

JOINTS SWOLLEN AND PAINFUL.—Acute arthritis, 518.

Malta fever, 741.

KIDNEYS, GREAT IRRITATION OF.—Mercury poisoning, 219.

KNEE, BULGING BEHIND.—Aneurysm, 371.

KNEE, PAIN BEHIND.—Aneurysm, 371.

KNEE, PAIN IN.—Flat foot, 529.

KNEE, SHARP, TEARING, SHOOTING PAINS DOWN BACK OF.—Sciatica, 411.

LAMENESS.—Aneurysm, 371.

LAMENESS, TRANSIENT.—Hardening of arteries, 368.

LANGUOR.—Encephalitis lethargica, 431.

Migraine, 429.

Mountain sickness, 235.

LANGUOR, EXTREME.—Pernicious anæmia, 379.

LASSITUDE, GENERAL.—Laceration of perineum, 620.

LAUGHING, EMOTIONAL STORM OF.—Hysteria, 420.

LEG, DULL ACHE IN CALF OF.—Flat foot, 529.

LEG, GRADUAL SWELLING OF.—Elephantiasis, 745.

LEG MUSCLES, CRAMPS IN.—Sciatica, 411.

LEG MUSCLES, WASTING OF.—Beriberi, 755.

LEG, PARALYSIS OF.—Hysteria, 421.

LEG, RED STREAKS UP.—Elephantiasis, 744.

LEG, SENSE OF HEAVINESS IN.—Beriberi, 755.

LEG, VAGUE, RESTLESS ACHE IN.—Heart trouble, 363.

LEGS, CONTROL OF, LOST.—Syphilis, 729.

LEGS, CONVULSIVE JERKINGS OF.—Epilepsy, 418.

LEGS, CRAMPS IN.—Cholera, 763.

LEGS DRAWN UP.—Colic, 670.

LEGS DROPSICAL.—Heart trouble, 363.

LEGS, EXCRUCIATING PAINS IN.—Syphilis, 729.

LEGS JERK IN EVERY DIRECTION.—Convulsions, 672.

LEGS, PAIN IN.—Caisson disease, 235.

Neuritis, 413.

Scurvy, 272.

LEGS, PARALYSIS OF.—Caisson disease, 235.

LEGS, SHARP, SHOOTING PAINS IN.—Locomotor ataxia, 433.

LEGS SWOLLEN.—Beriberi, 755.

LEGS, WEAKNESS AND LACK OF ENDURANCE IN.—Heart trouble, 363.

LEUCORRHEA.—Uterine tumor, 613.

LIGHT, SENSITIVENESS OF EYES TO, *see* Eyes, sensitiveness of, to light.

LIMB MUSCLES, STIFFNESS OF.—Meningitis, 427.

LIMBS, ACHING PAIN IN.—Tonsillitis, 477.

LIMBS AND FACE LIVID.—Poisoning from headache powder, 220.

LIMBS, EXCRUCIATING PAIN IN.—Smallpox, 706.

LIMBS, INVOLUNTARY, JERKY MOVEMENTS IN.—St. Vitus's dance, 417.

LIMBS, NUMBNESS OF.—Beriberi, 755.

- LIMBS, PAIN IN.—Erysipelas, 717.
 Mumps, 711.
 Nervous prostration, 415.
 Plague, 760.
 Railway spine, 426.
- LIMBS, PAIN ON HANDLING.—Infantile paralysis, 431.
- LIMBS, VIOLENT ACHING AND PAIN IN.—Influenza, 472.
- LIPS BLUE.—Cholera, 763.
 Mountain sickness, 234.
 Pneumonia, 676.
- LIPS COVERED WITH BROWNISH COAT.—Typhoid fever, 712.
- LIPS COVERED WITH WHITE PATCHES LIKE PIECES OF CURDLED MILK.—Thrush, 303.
- LIPS, FEVER SORES ON.—Empyema, 471.
 Pleurisy, 469.
 Pneumonia, 462.
- LIPS HOT AND FEVERISH.—Thrush, 303.
- LIVER, DULL PAIN AND SORENESS IN REGION OF.—Heart trouble, 363.
- LIVER, FEELING OF FULLNESS IN REGION OF.—Catarrhal jaundice, 346.
 Gallstones, 346.
- LIVER, PAIN IN REGION OF.—Catarrhal jaundice, 346.
- LIVER, SEVERE PAIN IN REGION OF.—Inflammation of gall bladder, 348.
- LIVER, TENDERNESS IN AREA OF.—Black-water fever, 753.
- LOSS OF WEIGHT.—Lead poisoning, 222.
- LUMP, HARD, IN BREAST.—Cancer, 799.
- LUMPS IN GROIN.—Plague, 760.
- LUMPS IN NECK.—Plague, 760.
- LUMPS UNDER ARM.—Plague, 760.
- LYMPHATIC GLANDS, ENLARGEMENT OF.—Rickets, 275.
- M**ANIA.—Menopause, 633.
 MEASLES-LIKE ERUPTION ON FACE OR TRUNK.—Epidemic dropsy, 757.
- MELANCHOLIA.—Menopause, 633.
- MEMORY IMPAIRED.—Nervous prostration, 415.
- MENSTRUATION, CESSATION OF.—Anæmia, 628.
 Chlorosis, 628.
 Diphtheria, 628.
 Heart disease, 628.
 Obesity, 628.
 Pregnancy, 636.
 Scarlet fever, 628.
 Tuberculosis, 628.
 Typhoid fever, 628.
- MENSTRUATION INCREASED.—Displacement of uterus, 611.
- MENSTRUATION, IRREGULARITY IN.—Appendicitis, 323.
- MENSTRUATION, PAIN AT PERIODS OF.—Displacement of uterus, 611.
- MENSTRUATION PROFUSE.—Uterine tumor, 613.
- MENTAL DEPRESSION.—Facial neuralgia, 410.
 Mountain sickness, 235.
- MENTAL DEVELOPMENT, RETARDATION OF.—Hookworms, 337.
- MENTAL DULLNESS.—Fermentation, 309.
 Lead poisoning, 222.
- MENTAL IMPAIRMENT.—Brain tumor, 426.
- MENTAL LAZINESS, MILD DEGREE OF.—Hookworms, 337.
- MORBID ANXIETY.—Nervous prostration, 415.
- MORBID FEARS.—Nervous prostration, 415.
- MORNING SICKNESS.—Pregnancy, 636.
- MOUTH, BURNING IN.—Naphtha poisoning, 223.
- MOUTH, DIFFICULTY IN OPENING.—Quinsy, 479.
- MOUTH, DIFFICULTY OF CONTROLLING FOOD IN.—Acute inflammation of tongue, 303.
- MOUTH DRAWN TO UNPARALYZED SIDE.—Apoplexy, 372.
- MOUTH DRY.—Mumps, 711.
- MOUTH, FROTHING AT.—Sunstroke, 210.
- MOUTH HOT.—Inflammation of mouth, 302.
 Thrush, 303.
- MOUTH, LINING OF, COOKED WHITE.—Carbolic acid poisoning, 219.
 Lysol poisoning, 219.
- MOUTH, METALLIC TASTE IN.—Mercury poisoning, 219.
- MOUTH, MUCOUS PATCHES IN.—Syphilis, 728.
- MOUTH, PAINS IN.—Facial neuralgia, 410.

MOUTH, PECULIAR PALLOR ABOUT.—
Scarlet fever, 698.

MOUTH, PUCKERING, METALLIC TASTE
IN.—Lead poisoning, 221.

MOUTH, RAISED SPECKS ON ROOF OF.—
Measles, 702.

MOUTH, REDNESS IN.—Inflammation
of mouth, 302.

MOUTH, REDNESS ON MUCOUS MEM-
BRANE OF.—Pellagra, 274.

MOUTH, ROOF OF, COVERED WITH WHITE
PATCHES LIKE PIECES OF CURDLED
MILK.—Thrush, 302.

MOUTH SHUTS TIGHTLY.—Convul-
sions, 672.

MOUTH SORE.—Pernicious anæmia,
379.

MOUTH, SWEETISH TASTE IN.—Lead
poisoning, 221.

MOUTH, SWELLING IN.—Inflamma-
tion of mouth, 302.

MOUTH, TWITCHING OF.—Convul-
sions, 672.

MOUTH, WHITE-BLUE SPOTS IN.—
Measles, 702.

MUSCLES, CRAMPING OF.—Strychnine
poisoning, 220.

MUSCLES FLABBY, DEFORMED.—
Rickets, 275.

MUSCLES, LACK OF TONE IN.—Hypo-
adrenia, 396.

MUSCLES OF FOREARM, PARALYSIS OF.
—Lead poisoning, 222.

MUSCLES SOFT AND FLABBY.—Neuri-
tis, 413.

MUSCLES, SPASM OF.—Epilepsy, 208.
Tubercular arthritis, 516.

MUSCLES, STIFFNESS OF.—Myalgia,
531.

MUSCLES, SWELLING OF.—Trichina,
339.

MUSCLES, TWITCHING OF.—Malignant
jaundice, 346.
Neuralgia, 409.

MUSCLES, WEAKNESS OF GROUPS OF.
—Infantile paralysis, 431.

MUSCULAR PAINS.—Trichina, 339.

MUTTERING.—Alcoholism, 208.

NAILS CRACKED AND BRITTLE.—
Hypothyroidism, 392.

NASAL PASSAGES RED AND SWOLLEN.
—Hay fever, 483.

NAUSEA.—Beriberi, 756.

Black-water fever, 753.

Bright's disease, 593.

Erysipelas, 717.

Extra-uterine pregnancy, 646.

Infantile paralysis, 431.

Inflammation of gall bladder, 348.

Influenza, 472.

Intussusception, 327.

Lead poisoning, 222.

Menopause, 633.

Migraine, 429.

Mountain sickness, 234.

Poisoning from infected foods, 225.

Pork tapeworm, 333.

Pregnancy, 636.

Pyæmia, 720.

Wood alcohol poisoning, 222.

NECK, GLANDS OF, SWOLLEN.—

Quinsy, 479.

Tonsillitis, 478.

NECK, LUMPS IN.—Plague, 760.

NECK MUSCLES, STIFFNESS OF.—

Meningitis, 427.

NECK, NEURALGIC PAINS IN.—Hys-
teria, 421.

NECK, RING-SHAPED LESIONS ON.—
Ringworm, 545.

NERVE TRUNKS SENSITIVE AND TENDER
TO PRESSURE.—Neuralgia, 409.

NERVOUS PROSTRATION.—Malta fever,
741.

NERVOUSNESS.—Fissure, 330.

Interstitial syphilis, 432.

Laceration of perineum, 620.

Pellagra, 274.

Pregnancy, 636.

Psychasthenia, 416.

Spasm of esophagus, 306.

Tuberculosis, 502.

NERVOUSNESS, EXTREME.—Colitis,
324.

Sour stomach, 310.

NEURALGIC PAINS.—Malta fever, 741.
Shingles, 414.

NEURALGIC PAINS IN BACK, HEAD, AND
NECK.—Hysteria, 421.

NIGHT SWEATS.—Malta fever, 741.

Tuberculosis, 511.

NIGHT TERRORS.—St. Vitus's dance,
417.

NODULES ON EARS.—Gout, 779.

NODULES ON JOINTS.—Gout, 779.

NOISY BREATHING.—Apoplexy, 208.

NOSEBLEED.—Dengue, 742.

German measles, 704.

Leprosy, 751.

Phosphorus poisoning, 220.

Scurvy, 272.

Typhoid fever, 712.

NUMBNESS.—Migraine, 429.
 NUMBNESS AND TINGLING.—Neuritis, 413.
 NUMBNESS OF ARM.—Writer's cramp, 423.
 NUMBNESS OF EXTREMITIES.—Railway spine, 426.
 NUMBNESS OF HAND.—Writer's cramp, 423.
 NUMBNESS OF LIMBS.—Beriberi, 755.
 NUMBNESS OF SKIN OF LEG.—Sciatica, 411.

OVARIES, HYPERSENSITIVE.—Hysteria, 421.

OVARIES, PAIN IN.—Ovarian neuralgia, 412.

OVERWEIGHT.—High blood pressure, 368.

PAIN.—Acute osteomyelitis, 523.
 Hernia, 322.

PAIN, ABDOMINAL, *see* Abdominal pain.

PAIN, ABDOMINAL, RESEMBLING GIRDLELIKE CONSTRICTION.—Syphilis, 728.

PAIN, ACHING, IN BACK.—Tonsillitis, 477.

PAIN, ACHING, IN LIMBS.—Tonsillitis, 477.

PAIN, ACUTE, IN TOE JOINT.—Gout, 779.

PAIN, AGONIZING, IN FACE.—Facial neuralgia, 409.

PAIN AND ACHING IN RECTUM.—Piles, 328.

PAIN AND SORENESS IN CHEST.—Measles, 702.

PAIN AND SORENESS IN REGION OF LIVER.—Heart trouble, 363.

PAIN AND SWELLING IN GROIN GLANDS.—Elephantiasis, 744.

PAIN AND TENDERNESS IN RIGHT SIDE OF ABDOMEN.—Appendicitis, 323.

PAIN AT BASE OF BRAIN.—Meningitis, 427.

PAIN BEHIND KNEE.—Aneurysm, 371.

PAIN, BURNING, IN SIDE.—Shingles, 414.

PAIN, BURNING, BORING.—Neuritis, 412.

PAIN, BURNING, IN STOMACH.—Mercury poisoning, 219.

PAIN, COLICKY.—Cholera, 763.

PAIN, COLICKY, IN ABDOMEN.—Mountain sickness, 235.

PAIN, EXCRUCIATING.—Gallstones, 347.

PAIN, EXCRUCIATING, IN BACK.—Smallpox, 706.

PAIN, EXCRUCIATING, IN BODY.—Syphilis, 729.

PAIN, EXCRUCIATING, IN LEGS.—Syphilis, 729.

PAIN, EXCRUCIATING, IN LIMBS.—Smallpox, 706.

PAIN, GRIPING, IN ABDOMEN.—Mushroom poisoning, 224.

PAIN IN ABDOMEN.—Caisson disease, 235.

Fermentation, 309.

PAIN IN ARM.—Writer's cramp, 423.

PAIN IN BACK, *see* Back, pain in.

PAIN IN BLADDER.—Appendicitis, 323.

PAIN IN CHEEK BONE.—Facial neuralgia, 410.

PAIN IN CHEEKS.—Mumps, 711.

PAIN IN CHEST.—Influenza, 472.

PAIN IN EAR.—Gathering in ear, 575.

PAIN IN EYE.—Iritis, 568.

PAIN IN EYEBALL.—Facial neuralgia, 410.

PAIN IN FEET.—Scurvy, 272.

PAIN IN HAND.—Writer's cramp, 423.

PAIN IN HIP.—Flat foot, 529.

PAIN IN JOINTS.—Dengue, 742.

Yaws, 746.

PAIN IN KNEE.—Flat foot, 529.

PAIN IN LEGS, *see* Legs, pain in.

PAIN IN LIMBS, *see* Limbs, pain in.

PAIN IN MOUTH.—Facial neuralgia, 410.

PAIN IN NECK, BETWEEN SHOULDERS.—Nervous prostration, 415.

PAIN IN OVARIES.—Laceration of perineum, 620.

Ovarian neuralgia, 412.

PAIN IN PELVIC ORGANS.—Hysteria, 421.

PAIN IN REGION OF LIVER.—Catarrhal jaundice, 346.

PAIN IN SIDE.—Shingles, 414.

PAIN IN SIDE OF HEAD.—Mastoiditis, 576.

PAIN IN STOMACH, *see* Stomach, pain in.

PAIN IN STOMACH WHEN FULL.—Achyia, 311.

- PAIN IN TEETH.—Facial neuralgia, 410.
- PAIN IN UPPER ABDOMEN.—Cancer of pancreas, 351.
- PAIN, IRREGULAR, IN JOINTS.—Acute arthritis, 518.
- PAIN, MUSCULAR.—Scarlet fever, 697. Trichina, 339.
- PAIN, NEURALGIC.—Malta fever, 741.
- PAIN ON CHEWING.—Facial neuralgia, 410.
- PAIN ON EATING OF ACID FOOD.—Mumps, 711.
- PAIN ON MOTION OF TONGUE.—Acute inflammation of tongue, 303.
- PAIN ON MOVEMENT.—Myalgia, 531.
- PAIN ON MOVEMENT OF JAW.—Mumps, 711.
- PAIN ON PRESSURE AND MOTION OF JOINT.—Tubercular arthritis, 516.
- PAIN ON SPEAKING.—Facial neuralgia, 410.
- PAIN ON SWALLOWING.—Hysteria, 421.
- PAIN OVER FOREHEAD.—Facial neuralgia, 410.
- PAIN OVER HEART.—Heart trouble, 363.
- PAIN OVER STOMACH.—Relapsing fever, 748.
- PAIN, RHEUMATIC.—Lead poisoning, 222.
- PAIN, SENSE OF, ABOLISHED.—Tumor in spinal cord, 435.
- PAIN, SEVERE.—Tumor outside spinal cord, 435.
- PAIN, SEVERE ATTACKS OF, ABOUT HEART.—Arteriosclerosis, 368.
- PAIN, SEVERE, IN BACK.—Dengue, 742.
- PAIN, SEVERE, IN HEAD.—Yellow fever, 739.
- PAIN, SEVERE, IN REGION OF LIVER.—Inflammation of gall bladder, 348.
- PAIN, SEVERE, IN SIDE.—Empyema, 471. Pleurisy, 469. Pneumonia, 462.
- PAIN, SEVERE, THROBBING, IN FINGERS.—Felon, 725.
- PAIN, SHARP, SHOOTING, BETWEEN RIBS.—Intercostal neuralgia, 410.
- PAIN, SHARP, TEARING, SHOOTING, DOWN BACK OF THIGH AND KNEE.—Sciatica, 411.
- PAIN, SHOOTING.—Neuralgia, 409.
- PAIN, SLIGHT, ON EXERTION.—Aneurysm, 370.
- PAIN, SUDDEN, INTENSE, IN UPPER ABDOMEN.—Acute pancreatitis, 350.
- PAIN, SUDDEN, SEVERE ATTACKS OF.—Neuralgia, 409.
- PAIN, SUDDEN, SEVERE, IN ABDOMEN.—Intussusception, 327.
- PAIN, SWELLING, AND TENDERNESS IN BREAST.—Acute mastitis, 622.
- PAIN, THROBBING.—Myalgia, 531.
- PAIN THROUGH BACK AND SIDE.—Kidney stones, 599.
- PAIN, VIOLENT, AND ACHING, IN BACK.—Influenza, 472.
- PAIN, VIOLENT, AND ACHING, IN HEAD.—Influenza, 472.
- PAIN WITH BOWEL MOVEMENT.—Colitis, 324.
- PAINFUL, SWOLLEN JOINTS.—Acute arthritis, 518. Malta fever, 741.
- PALENESS.—Arteriosclerosis, 368. Extra-uterine pregnancy, 646. Intussusception, 327. Lead poisoning, 222. Secondary anæmia, 378. Sunstroke, 210.
- PALPITATION OF HEART.—Beriberi, 755. Dyspepsia, 362. Greensickness, 379. Heart trouble, 363. Indigestion, 362. Malta fever, 741. Nervous prostration, 415. Pernicious anæmia, 379. Spastic constipation, 362.
- PALSY, LOCAL.—Interstitial syphilis, 432.
- PAPULES, GROUP OF.—Yaws, 746.
- PARALYSIS.—Neuritis, 413.
- PARALYSIS AND COLLAPSE FOLLOWING CONVULSIONS.—Arsenic poisoning, 220.
- PARALYSIS OF ARM.—Caisson disease, 235. Hysteria, 421.
- PARALYSIS OF BODY.—Apoplexy, 208.
- PARALYSIS OF FOREARM MUSCLES.—Lead poisoning, 222.

- PARALYSIS OF HAND.—Hysteria, 421.
- PARALYSIS OF LEG.—Caisson disease, 235.
Hysteria, 421.
- PARALYSIS OF SIDE.—Apoplexy, 372.
Hysteria, 421.
- PARALYSIS, TRANSIENT ATTACKS OF.—Arteriosclerosis, 368.
- PARALYSIS, TRANSITORY.—Brain syphilis, 427.
- PEEVISHNESS.—Infantile paralysis, 431.
- PELVIC ORGANS, PAINS IN.—Hysteria, 421.
- PELVIS, HEAVINESS IN.—Lacerations of perineum, 620.
Uterine tumor, 613.
- PELVIS, SEVERE PAIN IN.—Gonorrheal inflammation of Fallopian tubes, 616.
- PENIS, BURNING SENSATIONS IN.—Gonorrhea, 732.
- PERSPIRATION, COLD.—Intussusception, 327.
- PERSPIRATION, PECULIAR SOUR ODOR TO.—Acute arthritis, 518.
- PERSPIRATION, PROFUSE.—Poisoning from headache powder, 220.
Pyæmia, 720.
Sunstroke, 210.
Tuberculosis, 511.
- PERSPIRATION, PROFUSE, ACID.—Acute arthritis, 518.
- PIMPLELIKE BLOTCHES, CROP OF, ON BODY.—Syphilis, 728.
- PRICKLY SENSATIONS IN URINARY TRACT.—Gonorrhea, 732.
- PROSTRATION.—Blood poisoning, 720.
Extra-uterine pregnancy, 646.
Gonorrheal inflammation of Fallopian tubes, 617.
Naphtha poisoning, 223.
- PROSTRATION, GREAT.—Diarrhea, 673.
Heat exhaustion, 209.
Plague, 761.
Pyelitis, 596.
Quinsy, 479.
- PUFFING ON CLIMBING STAIRS.—Dust diseases, 234.
- PULSE FEEBLE.—Carbolic acid poisoning, 219.
Intussusception, 327.
Lysol poisoning, 219.
Naphtha poisoning, 223.
- PULSE RAPID.—Acute mastitis, 622.
Beriberi, 756.
Cellulitis, 723.
Erysipelas, 717.
Extra-uterine pregnancy, 646.
Hyperthyroidism, 392.
Inflammation of gall bladder, 348.
Malignant jaundice, 346.
Mountain sickness, 234.
Plague, 761.
Relapsing fever, 748.
Tuberculosis, 502.
Yellow fever, 739.
- PULSE RAPID, IRREGULAR.—Malta fever, 741.
- PULSE SLOW.—Catarrhal jaundice, 346.
Lead poisoning, 222.
- PULSE SLOW AND WEAK.—Poisoning from headache powder, 220.
- PULSE SMALL AND RAPID.—Blood poisoning, 720.
- PUPIL CONTRACTED.—Iritis, 568.
- PUPIL, RAPID, SPASMODIC CONTRACTION AND DILATATION OF.—Migraine, 429.
- PUPILS DILATED.—Alcoholism, 208.
Brain tumor, 426.
Heat exhaustion, 209.
- PUPILS, DISTURBANCE OF.—Meningitis, 430.
- PUPILS PINHEAD.—Opium poisoning, 221.
- PUPILS PIN-POINT.—Uræmic poisoning, 216.
- PUPILS SMALL.—Carbolic acid poisoning, 219.
Lysol poisoning, 219.
- PUPILS UNEQUAL IN SIZE.—Brain syphilis, 427.
- PUPILS UNEQUALLY DILATED.—Apoplexy, 208.
- PURGING.—Anaphylaxis, 231.
- PUS, DISCHARGE OF.—Gonorrhea, 732.
- PUSTULES.—Scabies, 540.
- R**APID AND LABORED BREATHING.—Sunstroke, 210.
- RAPID BREATHING.—Apoplexy, 208.
- RAPID, DIFFICULT BREATHING, *see* Breathing difficult and rapid.
- RAPID, HEAVY BREATHING.—Alcoholism, 208.
- RAPID, JERKY COUGH.—Hysteria, 421.

RASH, BRIGHT SCARLET.—Scarlet fever, 698.
 RASH ON SKIN.—Meningitis, 427.
 RASH, RED.—Shingles, 414.
 RECTUM, ITCHING IN.—Piles, 328.
 RECTUM, OOZING OF BLOOD FROM.—Piles, 328.
 RECTUM, PAIN AND ACHING IN.—Piles, 328.
 RECTUM, PUCKERING OF SKIN IN RADIATING LINES FROM.—Itching anus, 329.
 REDNESS IN MOUTH.—Inflammation of mouth, 302.
 REDNESS OF EYES.—Alcoholism, 208.
 RESPIRATION, *see* Breath and Breathing.
 RESTLESSNESS.—Black-water fever, 753.
 Infantile paralysis, 431.
 Measles, 702.
 Naphtha poisoning, 223.
 Rickets, 275.
 St. Vitus's dance, 417.
 RHEUMATIC PAINS.—Lead poisoning, 222.
 RIBS, BEADING OF.—Rickets, 275.
 RIGORS.—Encephalitis, 431.
 RINGING IN EAR.—Gathering in ear, 575.
 RINGING IN EARS.—Mumps, 711.
 Nervous prostration, 415.

SALIVA IN BLOODY FOAM.—Epilepsy, 418.
 SALIVA, INCREASED FLOW OF.—Facial neuralgia, 410.
 Inflammation of mouth, 302.
 SALIVA SCANT.—Mumps, 711.
 SCALP ABNORMALLY GREASY.—Oily seborrhea, 536.
 SCALP DRY AND COVERED WITH SCALES.—Dandruff, 537.
 SCALP, REDDISH, ROUND, SCALY SPOTS ON.—Ringworm, 544.
 SCROTUM, GRADUAL SWELLING OF.—Elephantiasis, 745.
 SEMICONSCIOUSNESS.—Hysteria, 420.
 Meningitis, 427.
 SENSATIONS BLUNTED.—Mountain sickness, 234.
 SENSITIVENESS, LOSS OF, IN AREAS OF BODY.—Leprosy, 751.
 SHIVERING.—Black-water fever, 753.

SHOULDERS, SHRUGGING OF.—St. Vitus's dance, 417.
 SHRIEK PRECEDING SPASM.—Epilepsy, 208, 418.
 SICK HEADACHE.—Biliousness, 349.
 SIDE, AGONIZING PAINS LOW DOWN IN.—Extra-uterine pregnancy, 646.
 SIDE, PAINS THROUGH.—Kidney stone, 599.
 SIDE, SORENESS THROUGH.—Kidney stones, 599.
 SKIN, BLACK AND BLUE SPOTS ON.—Yellow fever, 739.
 SKIN, BLUSH TINGE TO.—Mountain sickness, 234.
 SKIN, BRIGHT SCARLET RASH ON.—Scarlet fever, 698.
 SKIN BROWN, YELLOW, OR BLACK, IN PORTIONS.—Addison's disease, 397.
 SKIN, BROWNISH-RED NODULES ON.—Lupus vulgaris, 554.
 SKIN, BURNING, TINGLING SENSATIONS IN.—Neuralgia, 409.
 SKIN COLD.—Cholera, 763.
 SKIN COLD, CLAMMY.—Heat exhaustion, 209.
 Uraemic poisoning, 216.
 SKIN COLD, MOIST.—Naphtha poisoning, 223.
 SKIN DARK, WITH ODOR OF PHOSPHORUS.—Phosphorus poisoning, 220.
 SKIN DRY.—Cholera, 763.
 Typhoid fever, 713.
 SKIN, ERUPTION ON.—Pellagra, 274.
 SKIN, FACIAL, TINGLING AND BURNING OF.—Facial neuralgia, 410.
 SKIN GLOSSY.—Neuritis, 413.
 SKIN, HEMORRHIAGES FROM.—Scurvy, 272.
 SKIN, HEMORRHIAGES UNDER.—Yellow fever, 739.
 SKIN, HOT, MOIST FEELING OF.—Relapsing fever, 748.
 SKIN, INTOLERABLE ITCHING OF.—Jaundice, 345.
 SKIN, LARGE RED PATCHES ON.—Poison ivy or poison oak, 558.
 SKIN, LEMON COLOR.—Pernicious anemia, 379.
 SKIN, MEASLES-LIKE ERUPTION ON.—Dengue, 742.
 Epidemic dropsy, 757.
 SKIN OF CHEST, TENDER SPOTS ON.—Intercostal neuralgia, 410.

- SKIN OF LEG, BURNING, TINGLING, OR
NUMBNESS OF.—Sciatica, 411.
- SKIN PALLID, *see* Paleness.
- SKIN, PECULIAR ODOR FROM.—Ty-
phoid fever, 713.
- SKIN PUFFY, ROUGH, THICKENED.—
Hypothyroidism, 392.
- SKIN RASH.—Measles, 702.
Meningitis, 427.
- SKIN RED.—Neuritis, 413.
- SKIN, RED SPOTS ON UNCOVERED PARTS
OF.—Oriental sore, 766.
- SKIN, REDDISH PAPULES ON.—Psoria-
sis, 549.
- SKIN, ROSE-COLORED SPOTS ON.—Ty-
phoid fever, 712.
- SKIN, ROUND, RED PATCHES ON.—
Ringworm, 545.
- SKIN, SCALING OF.—Scarlet fever,
698.
- SKIN SENSITIVE.—Neuritis, 413.
- SKIN, SHINING RED ERUPTION OF.—
Erysipelas, 717.
- SKIN TURNS DARKER.—Pregnancy,
635.
- SKIN WAXY.—Beriberi, 755.
Pernicious anæmia, 379.
- SKIN YELLOW.—Black-water fever,
753.
Jaundice, 344.
Pernicious anæmia, 379.
Relapsing fever, 748.
Yellow fever, 739.
- SKIN YELLOWISH.—Blood poisoning,
720.
- SKIN, YELLOWISH BROWN PATCHES
ON.—Tinea versicolor, 546.
- SKIN, YELLOWISH GREEN PALLOR OF.
—Greensickness, 379.
- SLEEP DISTURBED.—Facial neuralgia,
410.
- SLEEP, INABILITY TO.—Measles, 702.
Sour stomach, 310.
- SLEEP RESTLESS.—Scarlet fever, 697.
- SLEEPINESS.—Encephalitis le-
thargica, 431.
- SLEEPLESSNESS.—Interstitial
syphilis, 432.
Nervous prostration, 415.
St. Vitus's dance, 417.
- SMARTING OF EYELIDS.—Conjunctivi-
tis, 565.
- SNEEZING.—Hay fever, 483.
Measles, 702.
Whooping cough, 487.
- SORE, REDDENED THROAT.—German
measles, 704.
- SORE THROAT.—Scarlet fever, 697.
Tonsillitis, 477.
- SORENESS AND PAIN IN CHEST.—
Measles, 702.
- SORENESS BACK OF EYEBALLS.—
Dengue, 742.
- SORENESS OF ARM.—Writer's cramp,
423.
- SORENESS OF BREAST.—Menopause,
633.
- SORENESS OF EYELIDS.—Chronic in-
flammation of eyelids, 563.
- SORENESS OF HAND.—Writer's
cramp, 423.
- SORENESS THROUGH SIDE.—Kidney
stone, 599.
- SPASM OF MUSCLES.—Epilepsy, 208.
- SPASM OF MUSCLES OF FACE.—Facial
neuralgia, 410.
- SPEAK, REFUSAL TO.—Hysteria, 420.
- SPEAKING IN WHISPER.—Laryngitis,
483.
- SPEAKING, PAIN ON.—Facial neural-
gia, 410.
- SPEAKING THICKLY.—Acute inflam-
mation of tongue, 303.
- SPEECH DISTURBED, JERKY.—St.
Vitus's dance, 417.
- SPEECH INDISTINCT AND UNINTELLI-
GIBLE.—Apoplexy, 372.
- SPEECH, LOSS OF.—Arteriosclerosis,
368.
Brain syphilis, 427.
- SPEECH, LOSS OF, TEMPORARILY.—
Migraine, 429.
- SPINE, SEVERE PAIN IN.—Yellow fe-
ver, 739.
- SPINE, TENDER SPOTS ALONG.—Nerv-
ous prostration, 415.
- SPLEEN, TENDERNESS IN AREA OF.—
Black-water fever, 753.
- SPUTUM, BLOODY.—Plague, 761.
- SPUTUM, THICK, BLOOD-TINGED.—Em-
pyema, 471.
Pleurisy, 469.
Pneumonia, 462.
- STAGGERING.—Heat exhaustion, 209.
- STARING APPEARANCE.—Hyperthy-
roidism, 393.
- STIFFENING OF BODY.—Epilepsy, 418.
- STIFFNESS OF ARM MUSCLES.—
Writer's cramp, 423.

- STIFFNESS OF MUSCLES OF BACK,
· LIMBS, AND NECK.—Meningitis,
427.
- STOMACH, BURNING IN.—Naphtha
poisoning, 223.
Sour stomach, 310.
- STOMACH, BURNING PAIN IN.—Mer-
cury poisoning, 219.
- STOMACH, DEFINITE POINT OF TENDER-
NESS IN.—Ulcer of stomach, 313.
- STOMACH DISTENDED WITH GAS.—
Colic, 670.
- STOMACH, HEMORRHAGE FROM.—
Ulcer of stomach, 313.
- STOMACH LIKE CROQUET BALL.—Gas-
tralgia, 312.
- STOMACH, PAIN IN.—Beriberi, 755.
Phosphorus poisoning, 220.
Ulcer of stomach, 313.
- STOMACH, PAIN IN, WHEN FULL.—
Achyilia, 311.
- STOMACH, PAIN OVER.—Relapsing fe-
ver, 748.
- STOOLS BLOODY.—Arsenic poisoning,
220.
Phosphorus poisoning, 220.
Yellow fever, 739.
- STOOLS CLAY-COLORED.—Catarrhal
jaundice, 346.
Malignant jaundice, 346.
- STOOLS GRAYISH OR CLAY-COLORED.—
Jaundice, 345.
- STOOLS HARD.—Constipation, 670.
- STOOLS LIGHT-COLORED AND FROTHY.
—Sprue, 758.
- STOOLS LIQUID AND FOAMY.—Fermen-
tation, 309.
- STOOLS LOOSE.—Sprue, 758.
- STOOLS MUCOUS.—Diarrhea, 673.
- STOOLS MUCOUS OR BLOODY.—Mush-
room poisoning, 224.
- STOOLS SMALL, FREQUENT, AND GREEN-
ISH YELLOW OR BROWN.—Diar-
rhea, 673.
- STOOLS STAINED WITH BRIGHT RED
BLOOD.—Fissure, 330.
- STOOLS, STRAINING AT.—Constipa-
tion, 670.
- STOOLS, STREAKS OF BLOOD IN.—Diar-
rhea, 673.
- STOOLS THIN, CONTAINING SMALL
WHITE, CURDLIKE MASSES.—
Cholera, 763.
- STOOLS VERY OFFENSIVE.—Typhoid
fever, 712.
- STRENGTH, EXTREME LOSS OF.—Addi-
son's disease, 397.
- STRENGTH, LOSS OF.—Pellagra, 274.
Secondary anæmia, 378.
Sprue, 758.
- SUPPORT, SENSE OF LOSS OF.—Lacera-
tions of perineum, 620.
- SWALLOWING, DIFFICULTY IN.—
Acute inflammation of tongue,
303.
Botulism, 226.
Encephalitis lethargica, 431.
Mushroom poisoning, 224.
Quinsy, 479.
Tonsillitis, 477.
- SWALLOWING, PAINFUL.—Mumps,
711.
- SWALLOWING, SENSE OF FULLNESS
UNDER BREASTBONE WHEN.—
Narrowing of esophagus, 305.
- SWEATING.—Encephalitis, 431.
Mumps, 711.
- SWEATING, PROFUSE.—Dengue, 742.
- SWELLING AND PAIN IN GROIN GLANDS.
—Elephantiasis, 744.
- SWELLING, GRADUAL, OF BREASTS.—
Elephantiasis, 745.
- SWELLING, GRADUAL, OF LEG.—Ele-
phantiasis, 745.
- SWELLING, GRADUAL, OF SCROTUM.—
Elephantiasis, 745.
- SWELLING, GRADUAL, OF VULVA.—Ele-
phantiasis, 745.
- SWELLING IN MOUTH.—Inflammation
of mouth, 302.
- SWELLING OF ABDOMEN.—Kala azar,
759.
- SWELLING OF ARM.—Aneurysm, 370.
- SWELLING OF CHEEKS.—Mumps, 711.
- SWELLING OF FACE.—Facial neural-
gia, 410.
- SWELLING OF FEET.—Greensickness,
379.
Secondary anæmia, 378.
- SWELLING OF FINGERS.—Felon, 725.
- SWELLING OF JOINT.—Tubercular ar-
thritis, 516.
- SWELLING OF MUSCLES.—Trichina,
339.
- SWELLING ON SOLE OF FOOT.—Ma-
dura foot, 747.
- SWELLING, PAIN, AND TENDERNESS IN
BREAST.—Acute mastitis, 622.
- SWOLLEN FACE, *see* Face swollen.
- SWOLLEN, FLUSHED FACE.—Yellow
fever, 739.

SWOLLEN HAND.—Cellulitis, 722.
 SWOLLEN LEGS.—Beriberi, 755.
 SWOLLEN, PAINFUL JOINTS.—Acute
 arthritis, 518.
 Malta fever, 741.

TASTE, PERVERSION OF.—Hysteria,
 421.

Pregnancy, 636.

TEARS, INCREASED FLOW OF.—Facial
 neuralgia, 410.

TEARS RUNNING OVER CHEEK.—
 Chronic inflammation of eyelid,
 563.

Iritis, 568.

Ulcer of Cornea, 568.

TEETH COVERED WITH BROWNISH
 COAT.—Typhoid fever, 712.

TEETH, DELAYED ERUPTION OF.—
 Rickets, 275.

TEETH, GRINDING OF.—Convulsions,
 672.

Epilepsy, 418.

Roundworm, 335.

TEETH, PAIN IN.—Facial neuralgia,
 410.

TEETH, SLATE-COLORED LINE AT BASE
 OF.—Lead poisoning, 222.

TEMPERATURE FLUCTUATING.—En-
 cephalitis, 431.

TEMPERATURE HIGH.—Scarlet fever,
 697.

TEMPERATURE HIGHER IN EVENING.—
 Typhoid fever, 712.

TEMPERATURE SUBNORMAL.—Ber-
 iberi, 755.

Carbolic acid poisoning, 219.

Heat exhaustion, 209.

Hypothyroidism, 392.

Lysol poisoning, 219.

Uræmic poisoning, 216.

TENDERNES IN AREA OF LIVER.—
 Black-water fever, 753.

TENDERNES IN AREA OF SPLEEN.—
 Black-water fever, 753.

TENDERNES ON LEFT SIDE OF ABDOMEN.—
 Colitis, 324.

TENDERNES, SWELLING, AND PAIN IN
 BREAST.—Acute mastitis, 622.

THIGH, SHARP, TEARING, SHOOTING
 PAINS DOWN BACK OF.—Sciatica,
 411.

THINNESS.—Kala azar, 759.

THIRST.—Naphtha poisoning, 223.

THIRST, GREAT.—Acute arthritis, 518.

Arsenic poisoning, 220.

Cholera, 763.

Diabetes, 774.

Mushroom poisoning, 224.

Plague, 761.

THIRST, UNQUENCHABLE.—Lead poi-
 soning, 221.

THOUGHTS, INABILITY TO CONCEN-
 TRATE.—Fermentation, 309.

THROAT BRIGHT RED.—Tonsillitis,
 478.

THROAT, BURNING IN.—Sour stomach,
 310.

THROAT, CONGESTION OF.—Beriberi,
 756.

THROAT, GRAYISH OR DIRTY WHITE
 MEMBRANE IN.—Diphtheria, 485.

THROAT RED AND GLOSSY.—Measles,
 702.

THROAT RED AND INFLAMED.—Scarlet
 fever, 697.

THROAT SORE.—Scarlet fever, 697.
 Tonsillitis, 477.

THROAT SORE AND REDDENED.—Ger-
 man measles, 704.

TINGLING IN EXTREMITIES.—Railway
 spine, 426.

TINGLING NUMBNESS.—Neuritis, 413.

TINGLING OF FACE.—Migraine, 429.

TINGLING OF SKIN OF FACE.—Facial
 neuralgia, 410.

TINGLING OF SKIN OF LEG.—Sciatica,
 411.

TINGLING SENSATION IN SKIN.—Neu-
 ralgia, 409.

TIRED FEELING.—Measles, 702.
 Typhoid fever, 712.

TOE JOINT SWOLLEN, RED, SHINY, AND
 ACUTELY PAINFUL.—Gout, 779.

TONGUE, BITING.—Epilepsy, 208.

TONGUE COATED.—Constipation, 319.
 Scarlet fever, 697.

Tonsillitis, 477.

Typhoid fever, 712.

Uræmic poisoning, 216.

TONGUE COVERED WITH WHITE
 PATCHES LIKE PIECES OF
 CURDLED MILK.—Thrush, 302.

TONGUE DRY AND COATED.—Blood
 poisoning, 720.

TONGUE HEAVILY COATED.—Uræmic
 poisoning, 216.

TONGUE HEAVILY FURRED.—Achyilia,
 311.

TONGUE RED AND RAW ON EDGES.—
Sprue, 758.

TONGUE RED AT MARGIN.—Blood poisoning, 720.

TONGUE, REDNESS OF.—Pellagra, 274.

TONGUE SORE.—Pernicious anæmia, 379.

TONGUE STIFF AND THICKENED.—
Acute inflammation of tongue, 303.

TONGUE STRAWBERRY-COLORED.—
Scarlet fever, 698.

TONSILS COVERED WITH DROPLETS OF
CREAMY PUS.—Tonsillitis, 477.

TONSILS COVERED WITH SMALL WHITE
PATCHES.—Tonsillitis, 478.

TONSILS SWOLLEN AND RED.—Tonsil-
litis, 477.

TREMBLING, SPELLS OF VIOLENT.—
Railway spine, 426.

TREMOR OF HAND, CONTINUOUS.—
Shaking palsy, 435.

TWITCHING OF MUSCLES.—Malignant
jaundice, 346.

ULCER ON PRIVATES.—Syphilis,
728.

UNCONSCIOUSNESS.—Apoplexy, 371.
Convulsions, 672.

Epilepsy, 418.

Malignant jaundice, 346.

Meningitis, 430.

Naphtha poisoning, 223.

Opium poisoning, 221.

URINARY TRACT, PRICKLY SENSATIONS
IN.—Gonorrhea, 732.

URINATE, CONSTANT DESIRE TO.—Cys-
titis, 601.

URINATE, FREQUENT AND PAINFUL DE-
SIRE TO.—Bladder stone, 603.

URINATE, URGENT DESIRE TO.—Black-
water fever, 753.

URINATION, BURNING SENSATION IN
THE URETHRA ON.—Black-water
fever, 753.

URINATION, DISTURBANCES OF.—
Bladder tumor, 602.

URINATION EXCESSIVE.—Diabetes,
774.

URINATION FREQUENT.—Pyelitis, 596.
Stones in kidney, 599.

URINATION FREQUENT, BURNING.—
Cystitis, 601.

URINE, BILE IN.—Malignant jaundice,
346.

URINE BLACKISH.—Black-water fe-
ver, 753.

URINE BLOODY.—Bilharziosis, 765.
Bladder tumor, 602.

Bright's disease, 593.

Cystitis, 601.

Elephantiasis, 745.

Kidney stone, 599.

Kidney tumor, 598.

URINE DARK AND SCANTY.—Carbolic
acid poisoning, 219.

Lysol poisoning, 219.

URINE, DRIBBLING OF.—Prostatic en-
largement, 607.

URINE HIGH-COLORED.—Bright's dis-
ease, 593.

URINE INCREASED IN QUANTITY.—
Pregnancy, 635.

URINE MILK-WHITE.—Elephantiasis,
745.

URINE SCANTY.—Acute arthritis, 518.
Beriberi, 755.

Bright's disease, 593.

Cholera, 763.

Intussusception, 327.

Relapsing fever, 749.

URINE SCANTY AND DARK.—Scarlet
fever, 698.

URINE SMOKY.—Bright's disease,
593.

URINE, SUGAR IN.—Chronic pancrea-
titis, 350.

VISION, BLURRING OF.—Migraine,
429.

VISION, DIMNESS OF.—Encephalitis
lethargica, 431.

Iritis, 568.

VISION DOUBLE.—Interstitial syphi-
lis, 432.

VISION, MOMENTARY DIMNESS OF.—
Mountain sickness, 234.

VISION, PROGRESSIVE LOSS OF.—Brain
tumor, 426.

VOICE HOARSE.—Croup, 675.
Laryngitis, 483.

VOICE, LOSS OF.—Hysteria, 421.

- VOICE, QUALITY OF, CHANGED.—Hy-
pothyroidism, 392.
- VOMITING.—Acute pancreatitis, 350.
Anaphylaxis, 231.
Bright's disease, 593.
Catarrhal jaundice, 346.
Chicken pox, 709.
Cholera, 763.
Diarrhea, 673.
Encephalitis, 431.
Epidemic dropsy, 756.
Erysipelas, 717.
Extra-uterine pregnancy, 646.
Gallstones, 347.
German measles, 704.
Hernia, 232.
Hysteria, 421.
Infantile paralysis, 431.
Inflammation of gall bladder, 348.
Influenza, 472.
Locomotor ataxia, 433.
Malignant jaundice, 346.
Menopause, 633.
Mercury poisoning, 219.
Mumps, 711.
Mushroom poisoning, 224.
Naphtha poisoning, 223.
Phosphorus poisoning, 220.
Plague, 760.
Poisoning from infected foods, 225.
Pregnancy, 636.
Pyæmia, 720.
Scarlet fever, 697.
Smallpox, 706.
Sunstroke, 210.
Tuberculosis, 511.
Typhoid fever, 712.
Ulcer of stomach, 313.
- VOMITING, FROTHY.—Epilepsy, 208.
- VOMITING NOT PRECEDED BY NAUSEA.
—Brain tumor, 434.
- VOMITING OF BLACK SUBSTANCE.—
Yellow fever, 739.
- VOMITING OF BLOODY MUCUS.—Arse-
nic poisoning, 220.
- VOMITING OF GREEN BILE.—Black-
water fever, 753.
- VOMITING OF MUCUS AND BILE.—
Yellow fever, 739.
- VOMITING WITH ABDOMINAL CRAMPS.
—Lead poisoning, 221.
- VOMITING WITH FECAL ODOR.—Intus-
susception, 327.
- VULVA, GRADUAL SWELLING OF.—Ele-
phantiasis, 745.
- WALKING AS IF ON PINS AND
NEEDLES.—Beriberi, 755.
- WALKING DIFFICULT.—Beriberi, 755.
St. Vitus's dance, 417.
Tumor of spinal cord, 435.
- WALKING DIFFICULT IN DARKNESS.—
Syphilis, 729.
- WALKING WITH BODY LEANING FOR-
WARD.—Shaking palsy, 435.
- WASTING AWAY OF LEG.—Sciatica,
411.
- WATER BRASH.—Sour stomach, 310.
- WATERY, IRRITATED EYES.—Measles,
702.
- WAXY SKIN.—Beriberi, 755.
Pernicious anæmia, 379.
- WEAKNESS.—Botulism, 226.
Dengue, 742.
Diabetes, 774.
Intussusception, 327.
Lead poisoning, 222.
Menopause, 633.
Mushroom poisoning, 224.
Pernicious anæmia, 379.
Poisoning from infected foods, 225.
Scurvy, 272.
Tuberculosis, 502.
Typhoid fever, 712.
- WEAKNESS, GREAT.—Bright's dis-
ease, 593.
Hypoadrenia, 396.
Mountain sickness, 234.
Plague, 760.
- WEAKNESS OF ARM MUSCLES.—
Writer's cramp, 423.
- WEAKNESS OF HAND MUSCLES.—
Writer's cramp, 423.
- WEAKNESS OF LOWER EXTREMITIES.—
Neuritis, 413.
- WEARINESS, GREAT, AFTER SLIGHT EX-
ERTION.—Nervous prostration,
415.
- WEEPING, EMOTIONAL STORM OF.—
Hysteria, 420.
- WEIGHT, LOSS OF.—Bright's disease,
594.
Cancer of pancreas, 351.
Diabetes, 774.
Facial neuralgia, 410.
Lead poisoning, 222.
Menopause, 633.
Nervous prostration, 415.
Secondary anæmia, 378.

WEIGHT, LOSS OF — *continued.*

Spasm of esophagus, 307.

Tuberculosis, 502.

Ulcer of stomach, 313.

WEIGHT, PROGRESSIVE LOSS OF.—

Sprue, 758.

WEIGHT, RAPID LOSS OF.— Hyperthyroidism, 392.

WHEEZINESS.— Dust diseases, 234.

WRITING, SPASMODIC CONTRACTIONS OF HAND ON.— Writer's cramp, 423.

WORRY.— Psychasthenia, 416.

WOUND, RED LINES RUNNING UP LIMB FROM.— Blood poisoning, 720.

YELLOW SKIN, *see* Skin yellow.

YELLOWISH BROWN PATCHES ON SKIN.— Tinea versicolor, 546.

YELLOWISH GREEN PALLOR OF SKIN.— Greensickness, 379.

YELLOWISH SKIN.— Blood poisoning, 720. 15

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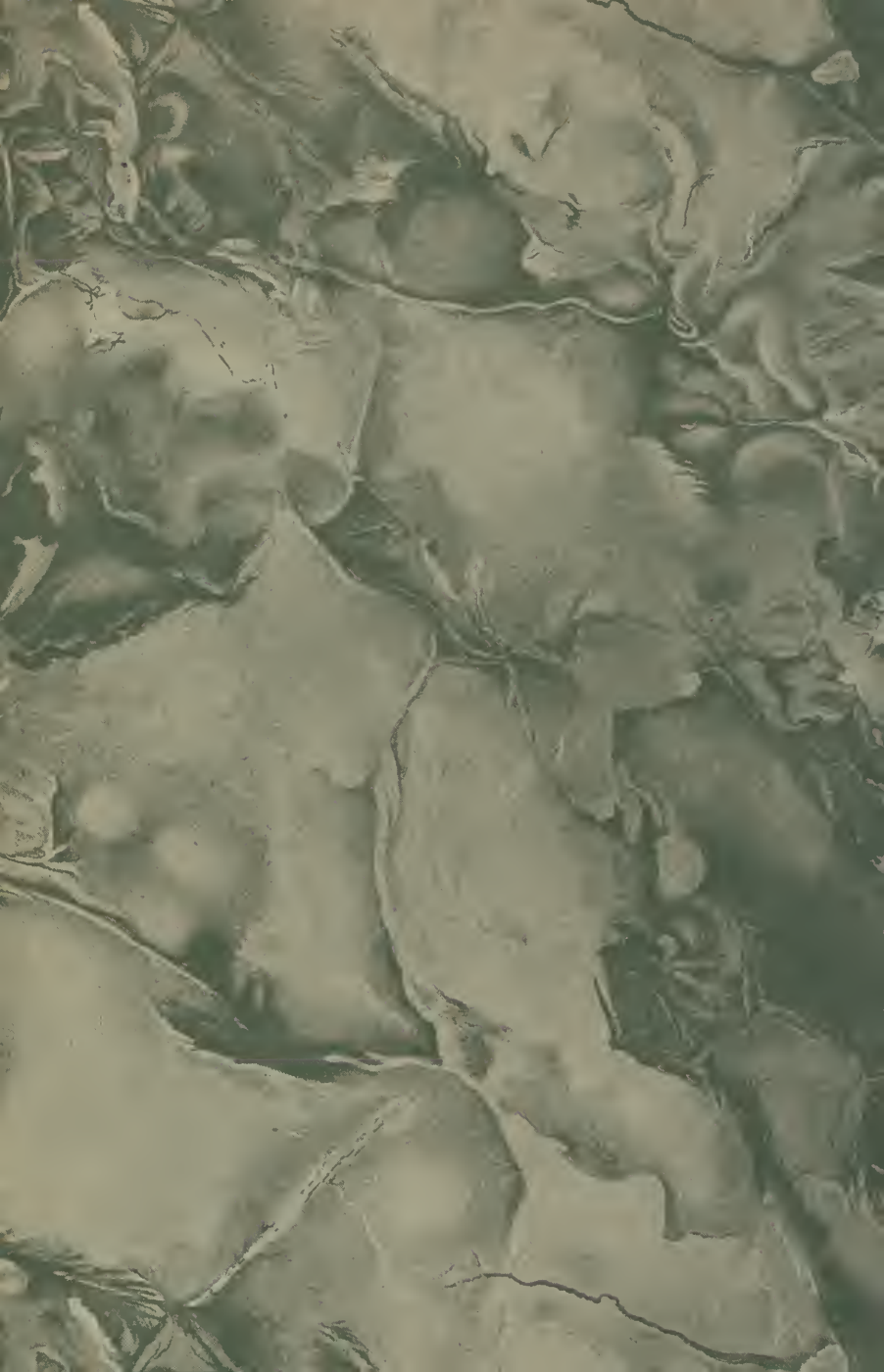
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188



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